

THE AUK:

A QUARTERLY JOURNAL OF
ORNITHOLOGY.

VOL. XLIX.

JULY, 1932.

No. 3.

THE BLUE GOOSE IN ITS WINTER HOME.

BY E. A. MCILHENNY.

(Plates IX-XI.)

FOREWORD.

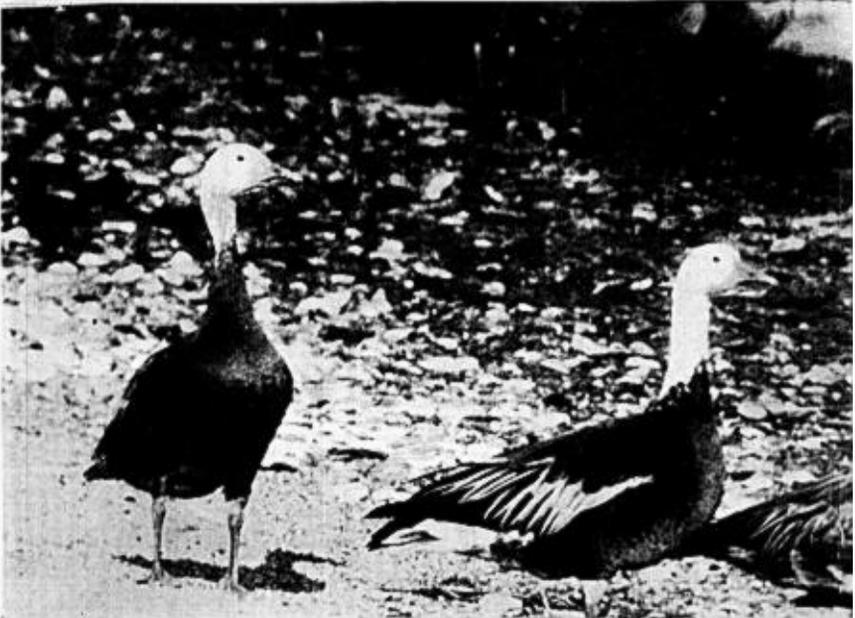
IN this article I shall give some intimate observations on the winter life of the Blue Geese as observed by me during more than fifty years of living among them on Avery Island, Louisiana, a property that has belonged to my family for more than a hundred years.

Avery Island is a range of hills rising more than one hundred and fifty feet above the salt marsh four miles north of the center of Vermilion Bay and a little west of the center of the coast line of Louisiana. The marshes bordering the Gulf of Mexico and its salt water bays, for a distance of thirty miles east of Avery Island and sixty miles west, constitute the winter home of at least seven-tenths of all the Blue Geese.

It is in this territory of Blue Goose winter concentration that I have lived. Fifty-two years ago on March 29, my father gave me a shot gun, and on that day I wing-tipped a Blue Goose, and kept it for several years as a pet. Since that date I have always had Blue Geese in captivity; sometimes as many as a hundred at a time so that I know them intimately both as wild and as domesticated birds.

Fall Migration.

Many times I have seen small flocks of Blue Geese on the Gulf coast in the last week of August, and this early arrival is simultaneous with the first southern flight of Pintail and Gadwall ducks.



Photos by E. A. McIlhenny.

BLUE GEESE ON GRAVEL BANK SOUTH SIDE OF VERMILLION BAY, LA.

The ducks stay but the geese do not. They seem to be advance scouts come to look their winter range over, and go north again after one or two days rest in the ponds back of the beach ridge. The next showing of Blue Geese is in late September when, if conditions are right, a considerable number may arrive and stay on some newly burned over areas of *Spartina patens* or *Scirpus americanus* where they find food and water to their liking. The birds arriving in September also should be looked upon as stragglers; some of them remain for the winter but many of them drift back north. The principal southern flight arrives during October and usually comes in two waves; the first, early in October, is generally only a small one, and seems to be the advance guard to locate the best early feeding grounds. These early October birds are restless and move from place to place without apparent reason and often a considerable proportion of them will go north again. The heavy migration occurs during late October and early November. These late birds come in an unbroken wave which usually lasts from a day and night, to three days and nights, and during that time, flocks of Blue Geese are constantly in sight and hearing of my house.

These flocks are small, numbering usually from ten to fifty or occasionally more than a hundred. They fly without fixed formation, but generally in the V, which is constantly changing due to the end birds closing into the hollow of the V or flattening it out until it is almost a straight line. They all fly at this season at a height of eight hundred to fifteen hundred feet, and it is easy to distinguish the Blue Geese, both young and adult, from the Lesser Snow Geese (*Chen hyperborea hyperborea*) which are mixed with them.

Some years there are considerably more Snow Geese in the flocks than in others, and sometimes many Snow Geese arrive and then go west along the Gulf coast to their real winter quarters. My judgement is, that on an average there is about one Lesser Snow Goose to every sixty-five Blue Geese in the area occupied by these birds at the mouth of the Mississippi River and in the Marsh Island to Calcasieu River territory. West of the Caceasan River the winter proportion of Snow Geese increases rapidly until the Blue Geese disappear entirely.

On November 1, 1917 a count at the Vermilion Bay goose beach showed 31 Snows and 1,250 Blues.

I quote from my letter to Mr. Paul G. Redington, chief of Biological Survey, Washington, D. C., written from Avery Island, October 27, 1928: "In 1928 the second migration of geese began to arrive here on the night of October 25. Flocks passed over all of that night, all the day of the 26th, the night of the 26th, and are still passing at midday today. Yesterday afternoon between 4:10 P. M. and 5:20 P. M. I counted fifty-two flocks going south to the marshes. The total number was six thousand and nine individuals, seven hundred and twenty-eight Snows, and the rest Blues, an unusual percentage of the former."

On December 6, 1928 I counted the flocks flying from their roosting place at the west end of Cheniere au Tigre and going east to Hell Hole, where they were feeding. To quote from my note book of December 6, 1928: "This morning I counted for one hour and a half the geese passing over from their roosting place south of Beef Ridge in the pasture, to where they were feeding near Hell Hole. Could not count all the flocks as sometimes six to ten were near together and they were flying only about four hundred feet high. Most of the flocks passed right over my head, and each flock counted was marked down as it passed. The flocks numbered 316, and contained 219 Snow Geese, and 16,405 Blues."

In a letter to Mr. Fredrick H. Kennard, written from Avery Island on October 21, 1919: I said "A few days ago there was quite a migration of Blue Geese passing Avery Island. They were flying at about one thousand feet in small parties, and one flock would not be out of sight before another could be seen. Often as many as four flocks could be seen at once. The flocks varied in numbers, from eight to thirty-five." Dates for the main migration for several years are as follows: 1891, Oct. 10; 1893, Oct. 29; 1896, Oct. 29 and 1900, Oct. 11. I could bring these migration notes down to date, but there is little variation in them and the above are sufficient to fix the usual time of the principal fall arrival.

Distribution.

Blue Geese during their stay in Louisiana might be called Salt Water Geese, or Salt Marsh Geese, as they are never found feeding

or sleeping more than eight miles back in the marshes from the salt beaches.

Blue Geese are confined to two distinct areas along the coast of Louisiana. First, the section bordering both sides of the mouth of the Mississippi River. This is an area of new alluvial flats and shallow bays extending from the mouth of the river for about thirty-five miles up stream, and extending back on both sides for a distance of about thirty miles. Small scattering flocks are seen occasionally as far east as the islands off the coast of Mississippi, but not regularly. Going west from the mouth of the Mississippi River, after leaving Bastian Bay, Blue Geese are entirely absent until Marsh Island is reached. From the east end of Marsh Island to the mouth of the Mermentau River, a distance of eighty-five miles, is the great winter concentration of these birds. In this section of the coast, including the bay shores and country from four to eight miles inland, winter seven-tenths of all the Blue Geese. Some years there will be a considerable flock in the marshes of Point au Fer on the east side of Atchafalaya Bay, and some winters there will be a considerable flock in the marshes bordering Morison's Pass, but these locations are not regular winter feeding places. On Marsh Island and in the marshes of the mainland west to the Mermentau River, Blue Geese are found in unbelievable numbers all winter long. The reason for these concentration areas is, of course, food.

Realizing the value of this coast section as a wild life refuge (for in it winter vast numbers of all the migratory wild fowl that come to the coast of Louisiana) I, during 1910 to 1914, through the co-operation of Mr. Henry W. DeForest, of New York, and the generosity of Mrs. Russel Sage, the Rockefeller Foundation, and Mr. Chas. W. Ward and through personal contributions, succeeded in purchasing and having consecrated, as wild life refuges in perpetuity, 174,663 acres of this area. Later the Paul J. Rainey wild life refuge of 28,000 acres was established, and as this lies between Marsh Island and one of the protected areas it is an important link in the permanent protection of the winter habitat of the Blue Goose.

Going west from the Mermentau River, the goose population of the coastal marshes is still large, but the Blue Geese diminish rapidly and Lesser Snow Geese increase as rapidly in proportion. After

crossing the Sabine River going west, while Blue Geese are found regularly associating with the Lesser Snow Geese, west, well past Galveston Bay, the proportion of Lesser Snow Geese is so far greater than Blue Geese that except for their dark color the Blue Geese would not be noticeable. Lesser Snow Geese are found regularly with the flocks of Blue Geese at the mouth of the Mississippi River and in the area of Marsh Island to the Mermentau River. The proportion of one species to the other varies in different winters. I would judge the average to be about one Snow Goose to between sixty-five and seventy Blue Geese. After leaving the Mermentau River going west, the proportion of Lesser Snow Geese rapidly increases until at the Sabine River it is about three Snows to one Blue. After leaving the Sabine the Snows increase more rapidly, and at Galveston Bay there is not more than one Blue to seventy-five Snows. From this point west along the Texas coast the Blue Goose is rare.

Food and Feeding.

The Blue Goose while in its winter habitat is not a grazer. It is primarily a grubber, an eater of roots, and is by choice a day feeder, never feeding at night unless in sections where it is greatly disturbed by shooting.

When the Blue Geese first arrive on the Gulf coast in October and early November, if there has been a good crop of feather grass (*Leptochloa fascicularis*) and wild millet (*Echinochloa crus-galli longiaristata*) they will feed, so long as the supply lasts, on the seed of these grasses. This seed, however, lasts at most only a couple of weeks and during the rest of their stay they eat nothing but the roots of the three-cornered grasses (*Scirpus robustus* and *Scirpus americanus*) and the roots of paille salle (*Spartina patens*). In the area bordering the mouth of the Mississippi River they feed to a considerable extent on the tubers and roots of the Delta duck potato (*Sagittaria platyphylla*). These three groups of plants constitute the great bulk of their winter food, although they may occasionally eat other roots or nibble young grass.

There is no more attractive sight in nature than Blue Geese feeding on grass seed. Geese are most sociable birds, and sleep and feed in large companies. In the early morning before sunrise, if the

weather is fine, and shortly after sunrise if the sky is overcast and the morning dark, the Blue Geese leave the spot where they have spent the night and in large flocks, often numbering from several hundred to several thousand, proceed directly to the spot where the morning food is to be gotten. This may be near or may be ten miles or more from their sleeping place, but there is no hesitancy in the choice of the location, for they go to it without wandering, and at once begin their breakfast. The large flocks leaving the night's resting place are not a complete section or even a majority of the great band that had gathered at the sleeping place, but are made up of numerous small flocks scattered through the large gathering at the resting ground. These flocks take the air at the same instant, with much loud calling which begins a couple of minutes before the take-off and lasts until they are straightened out in flight. When they first take the air on this morning flight the birds are jumbled into an irregular mass, but this soon breaks up into definite flocks which quickly separate or fall behind each other until what was at the start a mass of birds covering perhaps a quarter of a square mile, is quickly formed into small flocks, most of them in irregular triangle form. Arriving at the feeding place, the leading flock alights and the others join it again forming a compact mass. One of the peculiarities of Blue Geese is their excessive gregariousness; when on the ground they are usually in large compact masses. If breakfast is to be of grass seed, a most attractive sight is now to be witnessed.

Feather grass and millet grow in the same sort of wet land. The feather grass heads at about eighteen to twenty-four inches, while the millet seed stalks rise to four or six feet. The seeds of both of these grasses are eaten by all migratory wild fowl, and are especially attractive to Blue Geese. They often cover considerable areas, and I know of certain places where in favorable seasons they cover thousands of acres to the practical exclusion of all other grasses.

The flocks of Blue Geese having alighted in an area of seeded grass at once begin to feed.

Walking sedately forward, always facing the wind, they grasp the feather grass with the beak below the seed head, and holding their heads sideways, one eye to earth, one to sky, make a quick upward and backward movement of the head and neck which pulls

the grass between the mandibles leaving the seed packed against the upper side of the bill from which position it falls into the mouth when the bill is opened. When millet is the food, the seed head being much higher than the goose can reach, the stalk is first grasped as far up as possible, a couple of steps are taken pulling the stalk down and a new hold taken just below the seed head and the grain stripped as before. As the flock advances into the wind those in the rear take wing and alight in front, all as near the leader as possible and at once spread out like an opening fan, feeding as they go. This constant rising from the rear and alighting in the front gives one the impression of a great ball being rolled slowly forward.

After their morning hunger is appeased the birds spend the middle of the day in close compact flocks, and so quiet are they, and so seldom does a goose take wing, that unless their location is known, it would not be supposed that a band of many thousands of birds was in the vicinity. About 3:30 P. M. they begin to feel hungry again and small flocks will be seen rising from the lee side of the mass and going to the front. In half an hour after the first feeding begins all of them are so engaged, the evening action being the same as in the morning. Just a few moments after sundown on a bright day, or before sundown on a cloudy day, the return to the roosting place is begun in exactly the same way as the morning flight to the feeding ground. There are usually six to ten risings on each occasion before all of the big band will have shifted from roosting to feeding ground or vice versa. When the numerous small flocks take wing, not all the individuals continue on their flight, for some, finding that their particular company has not taken wing, will return to the main body again.

It is not every fall that grass seeds are available in sufficient quantity to be a real factor in the food of Blue Geese, since it is only when the low marshes are dry in the summer that the seed of these grasses sprout, but when conditions are favorable for a heavy growth it is certain there will be great numbers of Blue Geese, Mallard and Pintail ducks feeding on the seed as long as it lasts.

The staple food of Blue Geese is the heavy roots or rhizomes of three-cornered grass and paille salle. At times and apparently without reason, they seem to feed exclusively on one root or the

other. Both of these grasses grow in the brackish water marshes immediately back of the beach ridge along the Gulf and its bays. The same roots also form the principal food of the muskrat. When feeding on these roots the geese prefer to use a section that has been freshly burned over. They will fly a considerable distance from their roosting ground to find such a feeding ground although they fly past thousands of acres of the same grasses that have been burned for some time; these, however, have sprouted a young growth of green shoots and are not so desirable.

In the early fall it sometimes happens that no fires have been set in the marshes, due to excessive rain and mild weather keeping the grass green, and finding no "burns" to feed upon the geese will circle round in the air in large flocks with much calling and no regular formation until the leaders select a spot at which feeding may start. Then the entire flock, often numbering many thousands, will slowly settle over the chosen feeding ground where the grass may be four or five feet high and literally beat it flat with their wings. In this beating process the flock keeps in a compact mass and hovers over the grass going lower as the stalks are beaten down, until the birds disappear in the green growth. I have watched this clearing of a feeding place many times and have never ceased to wonder at the sagacity of these birds in using mass effort to gain a desired end. As soon as a large enough area is mashed down so that the birds can begin their feeding, it is rapidly enlarged as the roots around the edges are pulled up. This clearing of a feeding place is only done in three-cornered grass the stems of which are soft and pithy and are easily beaten down. Paille sale is a stiff wire grass, and I have never seen the geese try to clear a feeding place in it. The three-cornered grass has a large, heavy, hard root stalk or rhizome, and this is what the birds feed on. To get at these each goose digs with its beak a little well by removing the peaty soil and small roots until a rhizome is reached, this is grasped firmly in the beak and with a pulling power not to be expected in a bird of this size, the root is drawn out. If the section is too long to be swallowed, it is beaten on the ground by vigorous shaking of the head until broken or reduced to the proper size. It is remarkable what large pieces of root a goose will swallow and I have taken from the throat of a Blue Goose sections of rhizomes fully three-

fourths of an inch in diameter and three and a half inches long. The stomach cavity of the Blue Goose is larger in proportion to the size of the bird than in any bird I have seen, and the gizzard is enormous. When feeding, the latter is packed with food as is the esophagus. In pulling up the rhizomes of three-cornered grass, if after a good hold is gotten on the root, it cannot be pulled up by twists of the head and neck, the feet are moved up, wide apart and close to the beak, then bracing itself with the tail a pull is made with the combined muscles of the legs, back and neck. If the first pull is not sufficient to loosen the root the hold is shifted, and the effort renewed,

After an opening is gained in a bed of roots the feeding is somewhat easier, but considerable effort must be used for each root. The fine fibrous roots of three-cornered grass are discarded and only the rhizomes eaten. When the geese have cleaned up a section of ground and there is no water on the marsh, it has the appearance of a piece of old turf land that has been gone over many times with a spring-toothed harrow, leaving the grass roots in fuzzy tufts scattered evenly over the surface. If water is over the marsh, the feeding area presents a smooth surface of muck about ten inches in depth.

At times a large flock of geese will persist in feeding on an area of three-cornered grass until every root is pulled up. When this is done what is locally known as a "crevey" (meaning a place where all growth has been killed) is formed. These "creveys" are sometimes several miles long, and becoming covered with rain or tide water shortly after being dug by the geese, the small floating particles of vegetable discard are floated to the side and form low banks preventing their drainage. These "creveys" then become shallow ponds and it may be many years before grass grows over them again. I have seen creveys made more than forty years ago that are still open ponds. Many of the marshes frequented by the Blue Geese are used as cattle ranges in winter and it was for a long time customary for the cattle owners to keep men on horse back armed with guns to ride the range and keep the great flocks of geese moving so that the grass would not be destroyed. It was found quite useless, however, as often the flocks were so vast that they could not all be frightened into the air at one time, and the geese

near the man who was shooting would rise and alight on the other side of the flock, so this practice has been given up.

When feeding on the roots of *paille salle* (salty grass) the geese always select a fresh "burn" and follow about the same procedure as in getting the roots of the three-cornered grass. The rhizomes of *paille salle* are finer, however, and much easier to pull out. This grass makes an exceedingly heavy turf; the roots being matted thickly for more than a foot in depth. The geese, however, do not dig down for these roots more than three or four inches, so creveys are not often formed.

In order to digest the hard woody roots that constitute their food requires a large powerful gizzard and much grit. As there is but little sand and no gravel on the coast of Louisiana within the Blue Goose wintering area, the birds at times must travel a long distance to well known sand banks to get their grit. There are only two sand banks available in the territory between the mouth of the Atchafalya River and the Mermentau River. One of these is the famous Goose Bank on the southwest shore of Vermilion Bay; the other is a low marsh about two miles west of Chinere au Tigre, in Vermilion Parish. The Goose Bank on Vermilion Bay has been from aboriginal times the principal graveling place for the geese of Marsh Island, the marshes around Vermilion Bay, and a considerable distance west along the Gulf of Mexico. Bordering this beach on the west is a deep, small bayou, and about one thousand feet up this bayou is a large Indian kitchen-midden or camp mound made of clam and oyster shells. In this are many goose bones, and each storm tide with heavy waves washes out on the beach flint arrow heads that were evidently lost when their owners shot them at geese on the beach. Later this spot was the favorite place for sportsmen and market hunters to dig pits and lie in wait for the great flocks of geese that come daily for grit. The sandy part of this beach is 1011 feet long and 37 feet wide. I doubt if there is any one spot in the entire country where so many Blue Geese have lost their lives. It was to preserve this sand beach, for the use of the geese for all times to come, that led me to induce Mr. Chas. W. Ward to join me in the purchase of thirteen thousand acres of land surrounding it covering some of the most important Blue Goose feeding territory on the Gulf coast and deed it to the State of

Louisiana as a permanent wild life refuge, on July 25, 1911. Since that time many Blue Geese have been shot on that beach with a camera, but none with a gun.

I have spent many days in a blind on this beach watching the geese take sand and promenade in family parties up and down its hard smooth surface. I will quote from my note book under date of November 1, 1917: "First flock came to the beach at 6:25 A. M. twenty-one Blue Geese, next flock at 6:33, then a steady stream of small flocks. At sunrise nine minutes before seven o'clock there were about 1200 geese on the beach all Blues except thirty-one Snows and twelve White-fronts. The nearest geese are within twenty feet of me as I write. The farthest, not more than one hundred feet. Most of them are in the shallow water or at the water's edge busy eating sand. They take their sand standing in shallow water; holding the bill vertically on the sand opening and shutting it rapidly until a little hole is dug, and the bill is sunk until the water comes up to the bird's eyes. This is done to wash the fine sand and mud out of the hole, and allow the coarse sand to settle. Then the bill is opened and closed more slowly washing the fine sand out of the mouth, while the coarse sand is swallowed. When sufficient sand has been eaten they go onto the dry part of the beach and leisurely stroll about; often in family groups, greeting one another with much bowing of the head, and chattering in low voices. Each flock spends about one-half to three-quarters of an hour at the beach before returning to the feeding ground.

"All morning until three-thirty o'clock in the afternoon small flocks of geese were continually coming and leaving. It is remarkable how little attention they pay to me. My blind is made of drift-wood and is quite open, and when I am taking pictures with the motion camera, my side and all the camera are exposed, but the geese pay no attention except that occasionally a family party will in their promenading be attracted by the camera and come up to its foot to see what it is."

I have spent many days on this beach watching the geese, and their tameness has always been a cause of wonder. It is quite remarkable how soon these birds lose their fear of man where man protects them from harm. Here at the Goose Beach, as on the great game sanctuaries along the Louisiana coast, the Blue Geese

are almost as tame as barnyard fowl. On the sanctuaries the muskrat trappers walk or ride through the feeding flocks daily, and as they never harm the geese, no more attention is paid to them than to a cow or horse. It is interesting to note that geese do not take sand every day. I learned this fact by watching for certain geese which had distinguishing marks, and found that they came only every second or third day.

The second place mentioned where the geese get their grit is in what is known as "the pasture"—a fourteen thousand acre body of land north and west of Chinere au Tigre, and extending along the Gulf coast to Fresh Water Bayou. This area, I am sure, harbors more Blue Geese year in and year out than any similar tract of land on the Louisiana coast. There seems to be here just the conditions of food and roosting places that the geese love, for they come here every winter in vast numbers. The spot is about a mile and a half west of Chinere au Tigre and about one and a half miles inland from the Gulf and consists of a series of shallow sand bottom ponds that are visited daily during the winter by thousands of geese.

These ponds were up to 1912 favorite spots for the goose hunters to build blinds with the assurance that they would kill all the geese they could carry out. In 1912, I bought this land and closed these ponds to all shooting, and since then the geese have used them without molestation. As the sand in these ponds seemed to be getting exhausted, I, in the season of 1930, had dug a ditch wide and deep enough to float a considerable boat, and leading from one of my canals to the sand ponds. I secured from one of the gravel companies of Texas some specially screened gravel about the size of a No. 4 shot and spread one hundred and twenty tons of this in one of the sand ponds that winter. During the winter of 1930-31 this pond was at times so covered with Blue Geese that no more of them could get in it, and the ground for a considerable distance all around was also covered with the birds. So popular was this gravel, that after the geese had gone north I caused an examination to be made to determine how much of it was left, and I believe it would be impossible to gather with a sieve ten bushels. The geese had consumed practically all of it.

Spring Migration.

About the tenth of March the Blue Goose population of the Gulf coast begins to gather in two or three great bands. One of these is on the flats on the east side of the mouth of the Mississippi River; one on Marsh Island or Chenier au Tigre, and one in the vicinity of Bayou Constance.

Some years there is only one band in the area from Marsh Island to the Mermentau River. When this occurs this band is huge, covering a space from three to five miles long and from one half to a mile in width. The reason for these great gatherings is the approach of the northern migration. I have seen great concentrations of birds in many parts of the world, but nothing to equal the gathering of Blue Geese preparatory to beginning their spring flight. In a few days after they begin to gather only an occasional straggling goose will be seen away from the great flocks. These flocks do not go far for food and water, but always select as a gathering place a spot where food conditions are right and there they stay until they depart on their flight. The habits of these birds change materially during this pre-migration gathering. They become lazy, feed but little, are extremely noisy, fight among themselves, and at times a great section of the gathering will take wing and circle round calling loudly, then suddenly return to the main flock.

During these gatherings the unmated birds select their mates. This causes conflicts among the males and they fight hard and long, using the beak to hold the opponent, and both wings to beat him with. I was camped at the mouth of Fresh Water Bayou (which is the western boundary of my land in Vermilion Parish where it joins the Gulf), between March 14, and 21, 1891, the marsh bordering the beach between Fresh Water Bayou and Mulberry Island being the spot chosen that spring for the Blue Goose migration gathering. I have never forgotten that experience, nor have I ever heard so much continued noise. The edge of the big flock was not more than two hundred yards from my camp, and at night geese completely surrounded it even coming in between the two tents. There was never a moment day or night during the seven days I was there that the air was not filled with the shrill calls of the birds. For days and nights afterwards my ears rang with this peculiar noise. At Mulberry Island, at that time, lived Francois Pradier, a

negro, with his wife and four children. This man was in charge of the cattle on that section of the coast. I saw these six people with loud popping bull whips and tin pans try for several hours to move this flock of geese away from their house. They might just as well have tried to push back the smoke of a prairie fire. The geese, as these people advanced into the flock, simply got out of their way and closed right in behind them. Near their house was a shallow lagoon in which the geese stirred up the mud and water until it was like a thick paste and in their fighting got their wings so heavy with mud that they could not fly. Francois made tight a section of his calf pen and he and his family drove the mud covered geese into this pen until it was full. There seemed to be between four and five hundred geese in the pen. Francois said he had plenty of salt with which to salt hides and would kill these geese and salt them for his summer meat supply. I did not see this flock leave on migration, but Joe Pradier who came to my home about ten days later said the geese all left, except a few, six days after I had gone. This would make the date of the migration flight that year, March 27.

Another of these great spring migration gatherings of Blue Geese that I witnessed was in the last days of March 1914. I quote from my letter dated March 28, 1914, to M. L. Alexander, President of the Conservation Commission of Louisiana: "Due to the geese being disturbed in the outlying districts of Marsh Island, they have congregated for their spring migration in one vast flock quite near the warden's house, where they are thoroughly protected. On going through this flock with the warden in order to make an estimate of it, we found the flock to be solid for a distance of two and a half miles, and from one half to three-fourths of a mile in width. In riding through it, the geese were so tame that they would not take wing, simply walking away from the horses a few feet to the side of the path, and all the time we rode through the flock there were geese within ten or fifteen feet of us on both sides. We estimated this flock to contain from one and a quarter million to one and a half million geese." This observation was made on March 25, 1914, and this flock left on migration on the afternoon and night of March 28, as I was informed by warden Remik Saunier, who was in charge of this portion of Marsh Island at that time. I have witnessed these migration gatherings of Blue Geese very often and

have seen the birds pass over my home by the thousands of flocks on their way north for more than fifty years, but only twice have I witnessed the actual start of the movement. The first time was in 1916.

I had learned from the trappers late in March that the geese were in great numbers at Bayou Constance on the Gulf coast of Cameron Parish and I left home in my boat on the morning of March 24, reaching Constance Bayou at 3:40 that afternoon. For a considerable time before we reached Constance we could see great numbers of geese flying up and alighting in the marshes just back of the beach ridge. When we tied up in Constance about six hundred feet inside the Bayou, there were geese within one hundred feet of my boat and in looking over the marsh which had been recently burned I could see nothing but geese as far eastward as the eye could reach, but not a goose to the west of the Bayou. As we needed some fresh meat, I took my gun, and with one of my men walked about two hundred yards into the flock, fired one shot and we had all the geese that two of us could carry to the boat. The birds made so much noise that night that no one on the boat could sleep, so at two in the morning we ran up stream about a mile and a half where the noise could be heard only faintly. The next morning, March 25, I was on the beach early and walking almost to Bayou Rollover, a distance of about eight miles, found geese along the entire stretch. In some places the flock was almost a mile wide, in other places only a few hundred feet, while some three miles east from Constance the flock was often broken by considerable areas of standing grass. There are a number of large brackish water lagoons just back of the beach in which the geese drank and bathed. On March 26 I spent the whole day going through this flock of geese and as I walked, the edge of the flock was at no time more than fifty feet from me. During the afternoon of the 26th the flock seemed very uneasy. At times almost all of the birds would take wing and with great gabbling and calling circle round and round and then suddenly alight again. On the 27th, I was in and out of the flock all morning, the geese were just as uneasy as the evening before, until about 12:30 P. M. when they became very quiet, hardly making a sound. I was sitting on a drift log watching the flock when at 2:15 without any noise or warning, small flocks arose at widely

scattered intervals and without circling, started north. There was no attempt to gain altitude immediately, but there was a gentle upward grade until, when the flocks were half a mile away, they were not more than two hundred or three hundred feet off the ground. This departure continued without any regularity but constantly until dark, and I judge that by the time it got too dark for me to see them leaving, about one fourth of the flock had gone. This movement continued all night, for there was considerable calling and I could hear them in the distance as the small flocks moved along. In the morning of the 28th there were not more than four or five thousand geese where there had been a couple of millions the day before. As these flocks moved on migration I had ample opportunity to count the number of birds in many flocks; in none was there less than six or more than sixty-one. These two figures are the extremes.

I have on a number of occasions had goose eggs brought to me that were picked up at the migration gathering, and during the three days at Constance Bayou we found two goose eggs.

The next migration that I witnessed was in March 1922. The great pre-migration gathering that year was on Belle Isle ridge on my land four miles north of Chenier au Tigre. I went out with a moving picture outfit and operator to get pictures of the birds. This part of my land is divided by canals into two square tracts containing four square miles each, and the geese pretty well covered the square in which Belle Isle (a ridge a few feet higher than the surrounding marsh) is located. On March 18 I looked the flock over and decided on the best location for the picture taking. I noticed the central part of the flock was pretty solid, but the outside portion was made up of scattered bands and groups of birds, from a few hundred to several thousand. What I wanted was a picture of the whole flock massed. To get this the geese would have to be driven into the proper position. The morning of the 19th was clear with a light breeze from the west. At ten o'clock we left camp, as at that time I could see the geese had ceased feeding and were quiet. I sent four men in a motor boat to the eastern end of the square and four men on horseback rode through the flock and joined the men on foot. My chief warden, Lionel Le Blanc was in charge, and I had instructed him to line the men on foot about one hundred



Photos by E. A. McIlhenny.

UPPER.—BLUE GEESE IN FLIGHT.

LOWER.—BLUE GEESE ON BEACH AT VERMILLION BAY, LA.

and fifty yards apart opposite the thickest part of the flock and to place the men on horseback two on each side of the men on foot, and for the line then to advance towards where I would be located with the camera. I placed the camera about the center of the ridge to the west of the main flock and between it and a small flock of a few hundred birds. I then had geese on both sides of me, about four hundred feet in front and two hundred feet behind. By 11:30 A. M. the men started putting up the outlying flocks to the east, and the geese did exactly what I had expected; flew down wind over the main flock, turned up wind and lit on the western edge of the main gathering. In less than a half hour the camera was completely surrounded with geese, and the space between the main flock and the one to the west was covered with geese so thickly that no more could alight and they then began piling up behind the small flock. As we operated the camera we were standing in the open without anything to hide us and not a blade of grass in sight, for the geese had pulled up every living thing in their grubbing for roots. There we stood working with the camera and geese so near that it had to be focused over the nearest so that the mass would be in focus. The noise made by the birds was so deafening that in order to give directions to the man operating the camera I would have to pull his sleeve to gain attention, as he could not hear my voice even when I spoke loudly. Desiring to get a picture of a mass of geese in the air I had the men wave their coats and yell at the top of their voices. This started a portion of the geese between them and the camera into the air and I secured a wonderful picture of a million geese as they arose in a compact mass. The film shows the sky so covered that no light can be seen through them, and the horsemen are completely hidden.

On March 22 I went back to my camp at Belle Isle with the intention of staying with this flock of Blue Geese until they left for the north. The 23rd and 24th were spent looking over the flock. I walked through it, around it and sat in it for two days. The flock was much more compact than when I first saw it on the 18th. The geese scattered somewhat while feeding in the morning from daylight until about eight-thirty, and in the afternoon from about four o'clock to sundown, but they did not seem to be hungry and fed but little. In the middle of the day and at night the scattered

feeding flocks all came to the main flock and there was a great amount of calling and honking and much fighting. The geese were far more noisy during the middle of the day and at night than during the feeding periods. When the flock was concentrated in the middle of the day it covered about one and a half square miles. Lionel and I estimated it to contain at least one and a half million geese. We estimated between two and three thousand Lesser Snow Geese; all the others being Blues. As these birds were on good solid ground, I took a horse on the morning of the 25th and spent the day riding through the flock. The horse at times would almost step on the geese, and often many geese would be within five feet of my stirrups. The sun was hot that day and the birds seemed lazy and not as active as usual, and fed very little.

On the morning of March 27 I again watched this flock from horseback. Three times the whole flock rose, milled around for a few minutes over the place where they had been and then came to rest again. While in the air the honking and calling were deafening. At 11:30 A. M. the flock was very quiet and pretty much all of the geese sitting down. At 2:30 P. M. suddenly small flocks took the air and flew off without circling or turning. I held my compass on them and their course was due north. All afternoon, every few minutes, small flocks would leave the big flock and head north. There was no wavering or uncertainty in the movement, nor was there any regular interval between departures, which varied from seven to twelve minutes. The size of the flocks varied from five to forty-three. The small flocks rose without any audible signal and from no special part of the large flock, but several would start simultaneously from various parts of the big flock. These small flocks flew in a wavering somewhat straight line parallel to the direction they were headed. The Snow Geese took off with the Blues, sometimes only one white bird in a flock of Blues, sometimes three or four, often none at all. I stayed right in this flock until dark and at that time small flocks were leaving about as fast as when they first started. The migration must have continued nearly all night for in the morning there were only about five thousand geese left on Belle Isle. The remainder left on the afternoon of the 29th, except about three hundred birds that were probably too weak to make the flight. In the spring of 1931 the migration gathering was in

my pasture at the west end of Cheniere au Tigre. The migration flight started the afternoon of March 25. The gathering of March 1931 was in the same place and started the afternoon of March 28. Mr. A. M. Bailey of the Chicago Academy of Sciences, took moving pictures of this flock when it first began to gather.

Plumage and Voice.

What is the typical adult plumage of a Blue Goose? This question is one that I have never been able to solve for myself. There are far more Blue Geese with more or less white on the under parts than there are without white. I have shot thousands of these geese, have kept hundreds of them with wings tipped and have seen millions of them, from the young following their parents and still giving the gosling call of "tee-tee-tee," to the old fully mature bird. I have therefore had ample opportunity to observe these birds, and due to the extreme variation in the under plumage I have never decided which plumage could be called typical. There are only two parts of the plumage of adult Blue Geese that never vary; the head, which is always white and the wings which have always the same marking. I have seen Blue Geese without a dark feather on the entire body, but the wings were like all other Blue Goose wings. I have seen others without a white feather on the entire body, the dark slate of the body feathers extending up the neck to the head, but the head was white and the wings were marked like all other Blue Goose wings. It seems to me to be entirely unreasonable to think that Blue Geese which have white on their underparts are hybrids from a mating of Blue Geese and Lesser Snow Geese. There are far more Blue Geese with white on the underparts than without.

In hybrids of other birds that I have seen, there is never any definite plumage pattern or marking that was regular, but a combination of the plumage of both parents in ever changing variety. No two have had exactly the same markings. I have cross bred various wild ducks in the hope of establishing by selection a feather pattern and form that could be perpetuated after inbreeding several generations, but never succeeded in establishing an unvarying feather pattern, and the changes in the feathering of the wing shows most often. If the white bellied phase of the Blue Goose is

a hybrid there would be at least an occasional bird with a change in the plumage of the wings, but this I have never seen. I therefore doubt these two species interbreed, except very rarely. Mr. George M. Sutton, in 'The Auk' for July, 1931, plate V, shows an excellent drawing of two white bellied Blue Geese. Under this illustration he states: "The Female (right) is a hybrid Blue \times Lesser Snow Goose." Why he makes this positive statement I fail to understand, as both these birds are white-bellied Blue Geese. On page 359, of the same article he says: "the female of the nesting pair of Blue Geese which I found at the head of South Bay, and whose nest and four eggs I collected on July 14, was rather a blotched bird also, the belly being white and the dark chest and sides marked with spots and mottling of white." Further on he states, "at the famous feeding grounds of the species at the southern end of James Bay I personally saw many Blue Geese which were so much blotched as to merit the term 'piebald'."

I wonder where these "piebald" geese go? They do not come to the Gulf coast of Louisiana or Texas, or I would have seen some of them. In the thousands upon thousands of these birds I have carefully observed, I have only seen one Blue Goose that had a spot of white on the chest surrounded by dark feathers. This was a two-year old bird, brought to me alive by a muskrat trapper. I have this bird now. It is eleven years old, and what was at first a white spot is now a white breast as the white spot increased down and across with each July-August molt until the white breast spot extended to the white of the belly.

In 'The Auk' July 1931, in speaking of a migration of geese, Mr. Sutton says, "I venture the guess that fully twenty-five per cent of these flocks of migrants were Blue Geese, though it was impossible to distinguish satisfactorily the young of the Blue Geese from the young of the Lesser Snow." I again must differ with Mr. Sutton. The young of these two birds can be distinguished, as far as the human eye can tell the difference between a light and a dark object. The young of the Lesser Snow Goose is distinctly light, the young of the Blue Goose is distinctly dark and the same color all over. There is no white on the *belly, breast or back* of the first juvenile plumage. There is, however, a lightening of the feathers covering the areas that are to be white in the adult. In some



Photos by E. A. McIlhenny.

BLUE GESE GATHERING FOR MIGRATION ON BELLE ISLE, LA., MARCH 19, 1922.
THIS FLOCK WAS A MILE AND A HALF LONG AND OVER HALF A MILE WIDE.

individuals that I have had in captivity for many years, the white of the belly has gradually increased up the breast until the entire breast and chest became white. This increase in the area of the white of the underparts grows little by little with each July-August molt, sometimes requiring five or more years to be completed. My observations of the white underparts of Blue Geese kept in captivity is that in the first juvenile plumage the young show no white on the underparts, but there is a distinct lightening of the area on belly and breast (due to white tips of the dark feathers, which white tips wear off before the feathers are actually molted) that will become white with succeeding molts. That this white underpart will cover part of its area on belly during the first molt, the fall and winter after hatching, and the white area will increase with each molt sometimes for as much as eight years. The adult Blue Goose molts only once a year in July and August.

Mr. Sutton says (page 363): "Strictly speaking neither the Blue Goose nor the Lesser Snow Goose of Southampton Island can be considered today an absolutely pure-blooded species." This is rather a broad statement and may be true, but these hybrids do not migrate to the Gulf coast for their winter home, or I would have seen some of them during the more than fifty years I have shot and observed these birds. I have never seen a hybrid Blue Goose nor have I ever seen a hybrid Lesser Snow Goose, and I am just as familiar with the great flocks of Lesser Snow Geese of the Texas coast as I am with the Blue Geese of Louisiana. Because the majority of Blue Geese have white bellies and some have white breasts and an occasional one is all white except the wings, is no reason to say that they are hybrids. The Blue Goose happens to be a species in which the feather coloring of the underparts is variable.

I quote from my notes of November 2, 1917, written while watching these birds from a drift-wood blind on the Goose Beach of Ward-McIlhenny wild life refuge in Vermilion Parish, Louisiana, "A very juvenile Blue Goose within ten feet of me as I write (one of a family of four) is one that will be all white except the wings in the adult plumage. It has a uniform body plumage of very light slate, a white throat, white spectacles and white surrounding the bill about one half inch in extent; no other white feathers. It is much lighter than the three other young of this family. The two

old birds are normal with only the usual amount of white on belly, and three other young are normal. The head and upper neck of the very young are dark slate almost black and show no white feathers in the first plumage except a white ring around the eyes and a white chin patch. The white on the head begins to show in scattered white feathers on the cheeks and about the face when the juvenile molt begins in the fall."

"Many old and young in second plumage show a very distinct mottling of the breast due to the center of the feathers of the new and unworn plumage having dark slate centers and lighter tips. In many instances the two old birds are followed by their young, mostly four, sometimes three, and there is near me one brood of five. The old birds march sedately along, the male leading, nodding and gabbling to and with those of the company he apparently knows, the young following in single file paying no attention to the assembled multitude, and in the rear, keeping a watchful eye on the brood, comes the female. Families in this formation promenade up and down the hard smooth beach frequently passing within a few feet of where I am sitting partly hidden in my drift-wood blind, but showing not the slightest fear of me."

"In general the second plumage of the young is much lighter than either the first plumage or the adult plumage. The legs and bill of the very young are dusky almost sooty, while the legs and bill of the adult are bright reddish pink sometimes with a slight purple tinge."

"The old birds call to their young when walking or resting on the beach in a low deep 'cawk,' the young answers 'tee-tee-tee.' The call of the adult Blue Goose is 'awnk, awnk-ink and quank,' in many different tones."

When shooting Blue Geese I usually select a spot between the feeding and roosting ground, or between two feeding flocks. At such a time I make no attempt at concealment until I hear the geese calling excitedly and rapidly; I then hide for I know at once a portion of one flock will take wing and join the other. This leaving call is much shriller and more rapid than any other, and must be to notify the different individuals belonging to the several small bands that they must be on their way.

Mr. J. Dewey Soper, in his excellent pamphlet 'The Blue Goose'

in speaking of the juvenile plumage says, on pages 17-18, "In general appearance the juveniles are slaty brown in color and dusky as compared with matured individuals, but like them may have a variable amount of white on belly and flanks." I have never seen juvenile Blue Geese that had white feathers on the belly. The feathers on the belly in the juvenile are often tipped and edged with white, giving the effect of having been lightly powdered with white, but this light edging wears away, and white feathers do not appear until the first fall and winter molt. The feathers on the head and underparts are generally stained a reddish brown, due to these feathers coming in contact with the marsh mud and decayed vegetable matter from which these birds dig their food. Birds kept in clean high grass land lose this stain and the feathers are then their normal color.

Enemies.

Blue Geese during their stay in Louisiana have only one serious enemy, and that is man. Man kills them both for sport and for food, but the number of Blue Geese killed during any winter is but a very small part of what should be the normal increase. I am sure the entire kill by hunters is not in excess of 10,000 birds, and the muskrat trappers probably catch and kill that many more. Outside of this 20,000 a few are taken by Bald Eagles, and I once saw a Duck Hawk catch one. There are no other enemies.

I have on a number of occasions found dead Blue Geese and parts of them in the nests of Bald Eagles. Young eagles are hatched in late December or January, and the principal food supplied by their parents is ducks and geese and often Blue Geese. I was camped at the mouth of Fresh Water Bayou in Vermilion Parish in January 1895, and daily for six days witnessed an unusual and interesting sight. A pair of Bald Eagles had their nest in the top of a large live-oak tree on Beef Ridge about one and a half miles back from the beach, and the nest contained two young eagles. A very large flock of geese was feeding in the marsh on both sides of the bayou, only a short distance from my camp. I was sitting outside the camp at about eleven o'clock, when my attention was attracted to two Bald Eagles coming from the direction of their nest, which could be plainly seen from where I sat. As they neared the flock of geese which was sitting quietly on the marsh and beach, one of the

eagles, the larger one, which I learned afterwards was the female, started upward, circling. The other eagle flying slowly came to the flock of geese and swooped down as if to make a strike. A lot of the geese toward which he was darting rose and changed their position flying to one side or the other. He flew among them, and I expected to see him make a kill, which he could easily have done. Instead he turned and came back swooping at the main flock sitting on the ground, again many of the geese took wing and flew to the other parts of the flock; the eagle flying very low tried to get under them but they alighted and he turned and came back at the geese sitting on the ground. All this time his mate was slowly circling on the sea side of the flock. After the smaller eagle had made five or six dives at the flock on the ground he got under three geese that had become frightened and began to climb. Instantly the larger eagle swooped with a rush, joined her mate and both started circling under the rising geese who were going up and inland, as fast as they could. The smaller eagle circled slowly under the geese, the larger one very rapidly around them gaining height fast in large circles. When the geese were about five hundred feet in the air, one of them left the other two. Then the smaller eagle narrowed its circles under this goose driving it rapidly higher. Suddenly the larger eagle which had gotten considerably higher than the goose, shut its wings and shot with great speed down at it, struck the goose fairly and with bowed wings flew to its nest, its mate following. The eagle carrying the goose did not flap its wings after the strike until obliged to check itself to alight on its nest. The smaller eagle did not attempt to catch a goose then or at any other time, and I saw this same performance every day while I was in camp and always about the same time each day. I visited this eagle nest while I was in camp and counted the heads of thirty-one Blue Geese, fourteen Mallard ducks and seven Pintail ducks. The young eagles were about three weeks old.

There is a Bald Eagle's nest near my home at Avery Island in a big cypress tree that has been occupied for more than fifty years. I have seen these eagles occasionally catch a goose, but their favorite food is Coot, and during the time the migratory wild fowl are here and the eagles have young to feed they make a couple of trips every day to one of my duck ponds and each time they catch a Coot or crippled duck.

In the old days when the only means of getting about the bayous of the marshes was by wind or man-propelled boats, few Blue Geese were shot, as they inhabited out of the way places which were hard to get to, and sportsmen rarely spent the time and effort necessary to go after them, and the natives who lived near their haunts preferring ducks for food, rarely shot a goose. Since the internal combustion engine has made quick and cheap water transportation, the Blue Geese wintering at the mouth of the Mississippi River are constantly bombarded, from the opening of the season until its close. The geese are shot at so much, that they leave the marshes and go to the shallow flats outside the mouth of the river to spend the night. Each week end many parties of gunners leave New Orleans and go down the river in fast power boats, each having on board a number of shallow draft duck boats. A quantity of willow saplings are cut along the lower river and before daylight the coast between the roosting place of the geese and their feeding place farther inland, is lined with makeshift blinds each containing one or two gunners. If there is a strong off shore wind the geese will go inland fairly low, if the wind is light or from the Gulf they fly high. The gunners get plenty of shooting, for they are provided with heavy buck shot for the high ones, and fire at every flock that passes over, for with buck shot an occasional goose may be killed at a height of five hundred feet. More geese are killed at the mouth of the Mississippi River than on all the rest of the Louisiana coast. As I have caused almost all of the Blue Goose concentration area between the east end of Marsh Island and the Calcasieu River to be closed to shooting, there is now but little hunting of geese in this territory. If they are shot a few times on open territory, they go to the refuges where they have learned that they are safe and it is remarkable how quickly they learn to know the protected areas and how tame they become on them.

The scattered natives living along the coast kill a few thousand Blue Geese each winter and salt them for summer meat. When they go out to get geese they want a lot of them, and will not fire at a flock unless a large kill is ensured. Some of them have two trained oxen hitched together with rather a wide yoke, attached to which and dragging between the oxen is a narrow sled on which the hunter sits. He drives his team of oxen, slowly to the lee of the flock and

on an angle which will bring him diagonally to the thick of the flock. With this method of approach he can go into the flock and to any part he chooses. He will not fire until he is sure of a big kill. I have frequently seen from twenty to thirty-six geese killed in this way at a double discharge of a twelve-gauge gun loaded with No. 4 shot. Another method practiced by the natives is to ride a horse as near as possible to one of the big flocks, unsaddle the horse, take off the bridle leaving only a small rope around its neck with a half hitch around the horse's nose and the end of the rope tied to the hunter's belt. The hunter starts the horse walking so as to reach the geese on an easy angle, and keeps hidden on the side away from the birds. With his shoulder against the horse's shoulder and with the rope from the nose in his hand the hunter guides the horse at pleasure, and has no trouble in getting to any position he pleases for a shot.

The men who trap muskrats kill more geese in their traps than are killed with guns, in the principal Blue Goose concentration area. Their food being the same both geese and muskrats naturally occupy the same sort of land. The muskrat builds its nest in areas of three-cornered grass, and has runways that it uses in getting food extending quite some distance from the nest. The trapper fires the grass in these areas every winter so he may walk the marsh more easily and find the muskrat paths more readily.

A trapper usually sets from one hundred to one hundred and fifty traps, and goes to them every day. At times the geese will come into the same area and at such a time he will have to move his traps as he catches more geese than rats.

A few years ago a group of trappers on Marsh Island asked me to get permission for them to shoot the geese on the lands assigned to them, for although there were thousands of rats on the land the geese were feeding there in such numbers that the trappers could not catch enough rats to pay for their time and trouble. Of course I made them leave that part of the marsh.

The Blue Goose is not an especially good table bird, and its feathers stick so tightly to the skin that it is impossible to pick them without tearing it. When the local people kill them in numbers and wish to save the feathers for pillows and feather beds, they cut through the skin above the chest and down to the wings

and strip it off the breast and belly. They then cut the breast and legs free from the back-bone, salt the meat and gizzard and put the feathers in sacks with the skin still attached. In a couple of months some sort of a small insect has eaten all the skin and fat, and the loose feathers are then washed, dried and whipped to fluff them and are ready for use.

I have kept Blue Geese with my poultry at Avery Island for a very long time. The tameness of these captives has always interested me. A flock of wild Blue Geese will alight with my tamed ones and follow them to the barnyard, and often the woman who attends to the feeding will catch them in her hands as they eat with the others at her feet. I have wing-tipped Blue Geese in the morning, cut off the injured wing and had them eating out of my hand before night.

There is one danger to Blue Geese as a species that should not be overlooked and cannot be controlled; the cold of the Arctic. On two occasions I have noted a very small number of juvenile Blue Geese on the fall migration: in 1901 and 1917. During both these years, not only were there very few young birds with the migrating flocks arriving on the Gulf coast in the fall, but most of the young had one or both feet missing; due, I believe, to their having been frozen by early cold, before the feathers had grown sufficiently to protect them when sitting. A cold July and August accompanied by snow before the young could fly might easily destroy all or most of the young Blue Geese that year.

The Blue Goose is safe as a species so far as its winter home is concerned. Foreseeing the possible destruction of their winter feeding grounds by the march of civilization I induced others to join me in making the area where the bulk of these birds spend the winter a refuge for them for all time to come, or at least as long as our present method of civilized government shall persist.

It is pleasing to me to know that the system first advocated and put into operation by me of refuges for the breeding and wintering of our migratory wild life has now been accepted as the only sure method of perpetuating certain species, and is now a duty of our Federal Government.

There was one great bird that is now seen only rarely whose migration and feeding habits were identical with those of the Blue

Goose and which always associated with them, fed with them, and slept with them: that bird was the Whooping Crane. I wonder if Blue Geese will ever be exterminated as it has been?

Avery Island, Louisiana.