

TECHNICAL GAME SESSION

WATERFOWL DISTRIBUTION AND MIGRATION REPORT (Mississippi Flyway States—Sept. 1, 1956—Jan. 15, 1957)

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INTRODUCTION

For the third consecutive winter all of the 14 Mississippi Flyway states participated in a cooperative inventory study in order to gather information throughout the fall and winter on the migration and distribution of waterfowl. This program was directed by the Mississippi Flyway Council and carried out by the members of the Technical Section.

As in previous years statewide waterfowl inventories were made simultaneously in all of the 14 Mississippi Flyway states twice each month from September 1st through January 15th. Although most of the inventories were made by means of airplane a few were compiled from ground observations. From these censuses estimates of total populations by species for each state were made and the following report is based entirely upon the results of these inventories.

Wherever references are made in this report to the flyway it applies only to that portion located within the United States. In breaking down the flyway states into a compilation by regions, the northern tier represents inventories for Minnesota, Wisconsin, and Michigan, the central region represents inventories from Ohio, Indiana, Illinois, Iowa, Missouri, and Kentucky while the lower flyway applies to Arkansas, Tennessee, Mississippi, Alabama, and Louisiana.

The objectives listed for making this study are as follows:

1. To determine the pattern of distribution by species, for waterfowl, over that portion of the Mississippi Flyway within the United States throughout the fall and winter.
2. To determine the migration dates and time of local movements of waterfowl over the various regions of the flyway.
- *3. To determine the periods of peak abundance by species for each state as an aid in setting hunting season dates.
4. To gather information on the various ungunned species that pass through the flyway prior to the opening of any hunting season.
5. To gather information on area usage by waterfowl as an aid in determining the importance of individual lakes, etc., for wetlands preservation purposes and as an evaluation check on waterfowl development projects in each state.
- *6. To determine the types of habitat preferred by the various species of waterfowl (agricultural-lakes-marshes, etc.)
7. To set a base for detecting future changes in the flyway distribution pattern.
8. To gather information on the number of ducks using the Mississippi Flyway prior to early January that are credited to other flyways by the January inventory.
- *9. To gather information on crop damage problems.

GENERAL

Waterfowl inventories conducted in the Mississippi Flyway states during the winter 1956-57 were the most complete censuses made to date and provide an index to the number of migrating waterfowl, the travel lanes used by the various species, and the distribution of each species within the flyway. Reasonably accurate comparisons can be made between results obtained in 1954 and 1955 and those of the past winter.

In numbers of waterfowl the overall flyway picture this year was very good. According to inventories total duck and goose populations were up considerably over 1955. It is possible that part of the apparent waterfowl increases may have resulted from improvements in inventory procedures. It is more probable

* These objectives are not discussed in this report since they can best be worked out by the individual state technician.

that the increases are real and result from reported increases on the breeding grounds during 1956. Puddle duck species, with few exceptions, showed substantial increases in numbers inventoried last winter. Inventories of divers however indicated sharp declines in flyway numbers with the recorded losses confined almost entirely to populations in the northern tier of states.

The geese in the Mississippi Flyway were up this year as a result of increases in the Canada goose population. Blue, snow, and white fronted goose numbers exhibited little change from 1955. During migration this year the number of coots was up 25% but late winter populations were similar to those of 1955.

Considering all species the various migrations occurred about one week later than in previous years.

The first periodic inventories were again made on September 1st and at that time approximately one half million ducks were recorded with most of these found in the northern tier of states. The population was made up largely of blue winged teal, mallard, black duck, and wood duck. The northern states held almost all the ducks except for blue wings and wood ducks which were found throughout the length of the flyway.

By September 15th approximately one and a half million ducks were found in the flyway, chiefly as a result of increases in the blue-winged teal population. Duck numbers increased slowly and changes in species composition continued through September. By October 1st the duck population was comprised mainly of blue winged teal (32%), mallard (24%), pintail (9%), baldpate (7%), and black duck (6%). The northern states held 64%, the middle states 16%, and the southern states 20% of the ducks.

The flyway duck population showed only a gradual increase during October but the composition of the population changed markedly. Losses in blue winged teal, caused by migration from the flyway, were compensated for by gains in pintail, baldpate, and mallard down the flyway and canvasback, scaup, and redhead gains in the northern tier of states. The coot migration began in early October and reached a reported peak of one and three-quarter millions by October 15th. The white fronted goose population had arrived in southwest Louisiana by mid-October and the annual mass migration of blue and snow geese occurred in late October. Nearly three-fourths of the Canada geese destined to winter in the flyway had arrived by late October.

At the time of the November 1st inventory the Mississippi Flyway population amounted to four million ducks and all species were on the increase except blue-winged teal which were rapidly disappearing from the flyway. Diving duck numbers were at a high point for the whole winter period. Of the November 1st population 42% were mallard, 11% were pintail, 9% scaup, 8% ringneck, 6% green-winged teal, 5% baldpate, 3% black duck, 3% gadwall, 3% canvasback, and 2% redhead. The northern states had 33% of the duck population (primarily divers and mallards), the central region 42% (mallards), and the southern states 25% (mallards, pintails, green wings, gadwalls, and baldpates). Coot numbers were still at peak level on November 1st but declined rapidly in the following two weeks as the birds moved from the flyway to other areas. Goose numbers were increasing steadily in early November.

In most states the big mallard flight arrived on November 7th and 8th and by November 15th the flyway duck population had soared to a reported 7,640,000 ducks. This migration was very spectacular and compared in scope to the mass migration that occurred on November 2nd and 3rd in 1955. A similar mass movement of mallards into the flyway occurred in late October and early November in 1954. The 1956 flight was recorded by all states and comments noted on inventory forms reveal the movement of the birds into all flyway states at about the same time. Apparently the arrival of large numbers of mallards in early November into all Mississippi Flyway states is the typical migration pattern for this species.

The goose population of the Valley reached a peak on November 15th and at that time 900,000 were to be found. Coot numbers had passed their peak a month earlier and were in sharp decline by mid-November as large numbers disappeared into other flyways.

Duck numbers continued to climb and on December 1st the flyway population reached its highest recorded peak during 1956-57. Almost nine million ducks were tallied of which 67% were mallard, 9% pintail, 5% green-winged teal,

5% gadwall, 4% scaup, 3% black duck, and smaller percentages of the various other species in the flyway. The northern states had 5% (mallards, black ducks and divers), the middle states 44% (95% mallards), and the lower states 51% (mallards, pintails, and assorted other dabblers) of the ducks.

Total goose numbers declined in early December because of large reported losses in the Canada goose population. Blues and snows showed small losses and white fronts no change. Canadas were found largely in the central states (76% of the Canada population), while blues and snows (90%) and white fronts (100%) wintered in Louisiana.

With mid-December duck numbers began a gradual decline that was to continue for the remainder of the inventory period. Goose numbers had stabilized and showed little change. The coot population continued to decline.

By January 1st the total number of ducks was down to seven and a half million, a loss of a million and a half from the December 1st high. Probably continued migrations of pintail, gadwall, baldpate, and green-winged teal contributed to these losses but certainly hunter kill must have played a part in this population loss. The important duck was still the mallard (67% of flyway population) followed in numbers by the pintail (7%), green wing (6%), gadwall (5%), scaup (4%), black duck (3%), and canvasback and ringneck (1% each). Distribution of ducks by regions was: northern portion of the flyway 3%, central 38%, and southern 59%. Goose numbers and distribution was like that on December 1st. Coots numbered less than 200,000 and these birds were to be found primarily in southern states.

Inventories from two key states were incomplete for January 15th and no analysis of that period is made here. It was apparent, however, from subsequent winter inventories that waterfowl numbers and distribution changed little between January 1st and January 15th.

This year's work lends support to observations made in preceding inventories pertaining to migration routes and wintering areas of the various species. The mallard used the whole width of the flyway and wintered in every state. The black duck was important in the northeast portion of the flyway where the majority wintered. The green-winged teal, pintail, gadwall, and shoveller travelled the western half of the flyway and individuals of these species either passed through to winter in other regions or remained in the deep south. The wood duck, blue-winged teal, and baldpate tend to use the whole flyway during migration. The entire blue-wing population and a large percentage of the baldpate winter in other areas. A large number of divers exhibit an unusual migration in a southeasterly direction across the northern tier of states and out of the flyway. The ringneck, ruddy, and a portion of the scaup population follow the general migration route down the Valley.

The northern tier of states winters but few ducks but is extremely important during the migration period for all species. The central states are the principal wintering grounds for mallards and Canadian geese. The southern region is the most important area in late winter and contains over half of the flyway duck population. As in the central region the mallard is the most numerous species in late winter but in addition virtually the entire flyway population of other species (pintail, green-winged teal, gadwall, and baldpate) are to be found in the lower states.

The blue and snow geese are regular migrants in late October and early November and winter almost entirely in Louisiana. The white front is a goose of the central flyway and is important only in southwest Louisiana.

The coot spreads over the whole flyway during migration but the majority of these birds winter in other flyways.

MALLARD

The annual mallard migration appears to be characterized by the almost simultaneous descent of large numbers of these ducks into the Mississippi Flyway states in either late October or early November.

The 1956 migration differed only in timing with the mass flight arriving in all the states on November 7th and 8th. This flight was one week later than the big movement in 1955.

A few of these ducks were to be found in the upper part of the flyway in September and October and by November 1st a total of about a million and

a half mallards were recorded in the northern tier of states and Illinois. When the main flight came through a week later the flyway mallard population climbed to almost five million. The mallards gradually increased in numbers until December 1st when the peak flyway population of six million was recorded—an increase of 15% over the 1955 population. A gradual decline was noted until January 1st when only five million mallards were recorded on the inventories.

The distribution of this species was similar to preceding years with the central region wintering most of the mallards followed by the southern section and then the northern region. This year, however, there appeared to be significant increases in the central states' population. On December 1st 62% of the six million mallards were found in the central tier of states, 36% in the southern tier, and 2% in the three northern states. Compared to 1955 percentages the central region showed a 12% increase in wintering population and the southern region a 13% decline. The northern states gained roughly 1% over 1955. On January 1st the mallard population was distributed as follows: central 54%; southern 45%, and northern 1%. It appears that better than half of the mallards wintered north of Ohio River and at peak numbers two out of three of these ducks were to be found in central states. The mallard proved transient only to the three uppermost states in the flyway.

Distribution of the species by states was similar to that in 1955 but Illinois replaced Arkansas as the state with the most mallards. Of the mallards recorded on December 1st 28% were found in Illinois, 19% in Arkansas, 15% in Missouri, 10% in Louisiana, 9% in Indiana, 8% in Iowa, 5% in Tennessee, 2% in Alabama, and the remaining 4% in Ohio, Kentucky, Mississippi, Minnesota, Wisconsin, and Michigan. Distribution on January 1st was practically the same with 30% of the mallards in Illinois, 17% in Arkansas, 15% in Louisiana, 10% in Indiana, 9% in Missouri and the remainder in other states.

As in previous years the mallard was by far the most numerous duck in the flyway making up almost 70% of the total duck population when flyway numbers for all species reached a peak on December 1st.

PINTAIL

Following the pattern observed in previous years the pintail migration began in late August, continued throughout the fall, and was confined primarily to the western half of the flyway.

Although earlier movements were noted a large flight passed through the northern tier of states in early October and was subsequently recorded in the central and southern states during the mid-October inventory. The population then decreased rapidly in the central states (primarily Illinois) in late October but continued to build up in the lower flyway until December 1st. On that date 820,000 pintail were tallied in the flyway and 812,000 of this number were to be found in southern states. The 1956 peak population figure was 60% greater than that observed in 1955 inventories and as a result the pintails were second only to the mallards in numbers found in this flyway. The increase is apparently a result of the fact that a slightly larger percentage of the transient population stayed in the flyway for the winter instead of moving further south as in 1955.

On January 1st 85% of the wintering pintails were found in Louisiana, and 14% in Arkansas. The 1956 winter distribution was identical to that found in 1955.

BLUE-WINGED TEAL

The earliest waterfowl migrant in the flyway, the blue-winged teal appeared as far south as the Gulf coastal marshes in August, reached a peak in numbers in September, and had travelled through and out of the flyway by mid-October. Populations were greatest in the northern tier of states in mid-September and in the southern states in mid-October.

On September 15th, 680,000 blue-winged teal were censused with the majority found in the states of Minnesota (44%), Louisiana (22%), and Michigan (11%). By October 15th 70% of the blue wings in the flyway were in the coastal marshes of Louisiana. Only 48,000 remained on November 1st and virtually all of these migrated from the flyway shortly after this date.

As in the case of the pintail the September 15th peak population represents an unknown part of the total number of blue-winged teal that use the Mississippi Flyway as a travel lane while en-route to areas farther south. This year's

population peak on September 15th was 27% greater than the 1955 peak recorded on September 15th also.

The blue-winged teal are the first to arrive in the southern regions of the flyway in the fall and the last to leave during the spring. The vanguard of the spring migration appears in the coastal marshes of Louisiana during February. Additional numbers continue to arrive during March and the north bound flight reaches its peak about mid-April in Louisiana. Large numbers of blue wings are still to be found in the coastal areas during May and even as late as June 1st a few migrating stragglers are seen.

GREEN-WINGED TEAL

The migration and distribution of green-winged teal in 1956 was similar to that of 1954 and 1955. Although small earlier movements were noted (principally in Minnesota and Illinois) the main flight moved into the southern region of the flyway in early November. By mid-November 510,000 green wings were censused and 86% of this number were to be found in the Louisiana marshes. This year's green-winged teal population peak was about 10% less than the greatest number recorded during 1955. Four hundred thousand of these ducks were counted on January 15th with 91% found in the coastal marshes of Louisiana and 6% in Arkansas.

As in previous years few green wings were recorded during any given inventory in the upper sections of the flyway. As reported last year the indications are that many of the green-winged teal move down the central flyway and shift eastward to their wintering grounds in the coastal marshes of the Mississippi Flyway.

In addition to the wintering birds large numbers of green-winged teal are transients to this flyway and pass on to other areas after stopping over in October and November.

GADWALL

Fall inventories indicate that the gadwall tends to accompany the mallard during the migration period when the latter species begins its mass movement in late October or early November. Like the green-winged teal the gadwall appears to migrate through the western half of the flyway before reaching the wintering grounds in the coastal marshes of Louisiana.

On November 1st 110,000 gadwalls were to be found in the flyway largely in the southern states. When mallard numbers increased rapidly on November 7th and 8th so did those of the gadwall. By the November 15th inventory 315,000 gadwall were in the flyway and numbers continued to build up until the December 1st peak of 420,000. The January 1st wintering population consisted of an estimated 340,000 birds (up 13% from 1955) which as in 1955 were found in Louisiana (88%), Tennessee (5%), Alabama (3%), and Arkansas and Mississippi (2% each). The wintering population of this species has increased steadily for the past three years and the 1956 wintering population was almost 60% greater than found in 1954.

BLACK DUCK

The migration of black duck was similar in nature to that of last year. The peak population in the northern tier of states occurred on October 1st (110,000) and then declined gradually until December 1st.

Michigan contained 87% of the black ducks in the northern tier of states when the population peaked on October 1st. Of interest was the fact that between December 1st and December 15th the inventories show Michigan lost 37,000 black ducks and during this period Indiana registered an increase of 36,000 blacks.

The black duck population increased substantially in the central states during early November and continued to increase until the first of January. The flyway population reached a peak of 250,000 on December 1 and apparently stabilized at that figure for the winter. This is a decline of 45,000 from the December 15th, 1955 peak. Distribution was essentially the same as in years past. At the peak on December 1st the important states in order of numbers of black ducks were Michigan, Ohio, Tennessee, Illinois, and Indiana. On January 15th the wintering birds were found largely in Ohio (28%), Michigan (17%), Indiana (15%), and Illinois (14%).

Although scattered in all of the flyway states the black duck is important only in the northeastern portion of the flyway. At its peak on December 1 the black duck made up 3% of the total flyway population.

BALDPATE

The baldpate entered the northern states early as usual this year, but were perhaps 10 days later than last year in their arrival in the deep south.

A review of the 1956 bi-weekly inventories reveals the orderly progress of this species down the flyway. Numbers peaked in the northern tier of states on October 1st, in the central tier on October 15th, and in the southern tier between November 1st and November 15th.

The peak flyway population of 215,000 baldpate showed an 85,000 duck decline from the 1955 peak of 300,000. The big difference in numbers was found primarily in Louisiana where habitat conditions in 1956, as a result of drought, were such that large buildups of this species did not occur during migration through the state. Low baldpate numbers reflected poor marsh conditions and probably were not real population losses.

The wintering population on January 15th of 80,000 baldpate was practically the same as that found in 1955. Of this number, Louisiana contained 50%, Alabama 15%, Kentucky 13%, Arkansas 10%, and Tennessee 8%. The distribution was similar to that found in previous years.

This species seems to use both eastern and western halves of the flyway in its movement southward and unknown numbers use this flyway as a travel lane only, wintering in other regions. From mid-November on the total population declines rapidly in the southern portion of the flyway.

The inventories indicated a dispersal of baldpate in early January from areas in Tennessee and suggest their arrival into other areas in Kentucky, Alabama, and Arkansas. Between January 1st and January 15th, Tennessee lost 15,500 baldpate and Kentucky gained 10,000, Alabama 2,000, and Arkansas 1,000. This probably represents only a small interstate movement of the species but it was apparently recognized in the census.

The baldpate population peak of October 15th comprises about 2.5% of the peak flyway total waterfowl population (December 1st).

SHOVELLER

The shoveller is another species that migrates primarily down the western portion of the Mississippi Flyway. During migration Minnesota, Missouri, Tennessee, and Louisiana are the only states recording the shoveller in important numbers. From the standpoint of wintering grounds Louisiana is the only important state.

Migration begins early and continues into November. The high for the southern section was reached between the October 15th and November 15th inventories. The flyway population peaked on November 15th at 70,000 shovellers and roughly 65,000 spent the winter in the deep south. On January 15th 5,000 of these ducks were recorded in Tennessee and 55,000 in Louisiana—practically the entire flyway population.

It is apparent that many shovellers use the flyway as a travel lane only and winter in other areas. Spring censuses substantiate this fact since populations in excess of the November 15th, 1956 flyway peak were recorded in the Louisiana coastal marshes in March 1957.

Attempts to determine the proportion of shovellers in the total flyway population are difficult when so many of the ducks are only transients. Comparison of peak shoveller numbers with peak flyway numbers indicate that these ducks make up less than 1% of the population.

WOOD DUCK

Another early migrant of the flyway, the wood duck presents unique problems since this species is virtually impossible to census. The time of migration and the areas of occurrence of the wood duck seem to be determined with reasonable accuracy but the number of individuals involved is largely unknown.

As in 1954 and 1955 the wood ducks began leaving the northern tier of states in early October and the central states in late October and early November.

Wood ducks were gone from the upper region by November 1st and from the central area by November 15th.

It is believed that information on the period of migration and distribution of this species is at present reasonably accurate. A satisfactory index to population changes has not yet been found.

SCAUP

Scaup populations declined during 1956-57 but still remain the most abundant species of diving duck in the flyway. The maximum population during the 1956-57 migration was 407,000 compared to previous years' maximum population of nearly a million, a 58.6 percent decline. Major movements into the northern states were under way by October 15th, continuing until November 15th with a rapid exodus immediately following the mid-November census. The three northern states lost over 140,000 scaup during November and in the same period the six middle states also lost 140,000.

The gain in the five southern states following this exodus was approximately 120,000 indicating that the scaup moved south from the middle states while movements from the northern states were out of the flyway.

The maximum population throughout the flyway occurred on November 15, with 37.2 percent in the northern states, 28.6 percent in the middle states and 34.2 percent in the southern states. This fairly well-spread population differed from that of the previous year. The maximum "build-up" for the flyway for 1955-56 was October 15th with a higher proportion in the northern states.

The greatest concentrations occurring in individual states of each group were in Michigan, Illinois, and Louisiana.

Louisiana also wintered the greatest number with 89.4 percent of the total winter population in the southern states.

Comparing the maximum population (407,700) to the wintering population (273,000) it may be seen that only 66.9 percent of migrant scaup available to Mississippi flyway hunters remained in the flyway.

RINGNECKS

Ringnecks were present in the northern states on September 1st, with definite movements under way by September 15th, Minnesota having the largest numbers at this early date. By October 15th good populations are scattered throughout the northern tier of states, over the middle states, with numbers occurring as far south as Tennessee.

Peak concentration of the entire flyway on November 1st was 308,000. The previous year the peak "build-up" occurred at the same date and in nearly identical numbers. The population distribution at this date was 63.9 percent in the northern states, 32.4 percent in the middle states, and 3.6 percent in the southern states. Major concentrations were in Minnesota, Wisconsin, Illinois and Tennessee.

After November 1st the population dwindled rapidly throughout the flyway except for the concentrations in Tennessee and Louisiana. Unlike canvasback, redhead, and scaup the ringneck duck movements were well confined to the flyway until they reached the southern states, then spread out, presumably in an eastward direction.

Ringnecks were gone from the northern states by December 15th. The wintering population on January 15th was 93,000 with 90% in Louisiana, Arkansas, and Tennessee.

Comparing the maximum population to the wintering population it may be seen that only 30.5 percent of the ringnecks available to Mississippi Flyway hunters remain in the flyway.

CANVASBACK

Small numbers of canvasback were in Minnesota by September 15th, 1956. They increased gradually in the northern tier of states in early October, reaching peak abundance by October 15th at 141,000 with 60,000 remaining through December 1st. A marked exodus from Minnesota after November 1st was associated with a marked increase in Wisconsin and Michigan on November 15th. By November 13th an increase was also noted in the middle and southern states indicating a few canvasback moved southward but a major portion appar-

ently moved eastward from the flyway as losses from the northern states were not compensated by gains in the southern states.

Migration movements were earlier by comparison to the previous year and smaller numbers were observed. The maximum flyway population this year (141,000) was 62.5 percent less compared to the peak populations (377,000) in 1955-56. During the period of maximum abundance 98.4 percent of the flyway population was in the northern states.

Some 96,000 canvasback wintered throughout the flyway, 36.6 percent were in the northern states, 8.3 percent in the middle states and 55.1 percent in the southern states. Michigan and Louisiana had the largest wintering populations. The wintering population was 68.2 percent of the maximum flyway population.

REDHEADS

Following the pattern of the previous years the redheads during 1956-57 moved across the northern states in an easterly direction. The main difference was that fewer were present and the movements were earlier. The first migration started in late September with sizeable numbers moving into Minnesota and Michigan by October 1st and reaching maximum numbers by October 15th. The population held in the northern states through November 1st with a sharp drop in Minnesota and Wisconsin by November 15th. A fair population remained in Michigan until after November 15th but continued to decline until December 15th when ice forced them out. The lack of redheads anywhere south of the northern tier of states again demonstrates the eastward movement of this species.

Distribution during the peak "build-up" on October 15th was 99.2 percent in the northern states with only traces showing in the middle or southern states. Comparing the maximum population (141,600) to that of 1955-56 (205,000) a 30.9 percent decline is indicated.

A little less than 12,000 redheads or 8.1 percent of maximum population wintered within the flyway, 86.2 percent in the southern states, mostly in Louisiana.

RUDDY DUCKS

The ruddy duck is of minor importance, but it is significant to note the species was observed in greater abundance last winter while redheads, scaup, and canvasback were observed in fewer numbers. Comparing maximum populations of 1956-57 to that of 1955-56, a 28.2 percent increase was noted.

Movements of ruddies started in late September in the northern states with peak build-up of 60,000 occurring by October 15th. Only small numbers were observed in the middle states during the migration period, but the population for these states also hit their peak on October 15th. In the southern states a population of 42,000 was reported on December 15th. These numbers remained constant through January 15. The wintering population was 70.3 percent of the peak build-up for the flyway.

OTHER DUCKS

Mergansers, goldeneyes, buffleheads, and mottled ducks comprised an additional 2% of the Mississippi Flyway waterfowl population. Peak populations of mergansers and goldeneyes were down somewhat from the 1955 figures. Bufflehead and mottled duck numbers remained about the same.

Michigan and Wisconsin were the two important wintering areas for goldeneyes and buffleheads.

The mottled duck is not migratory and occurs in numbers only in gulf coastal marshes where it is locally important.

CANADA GEESE

The migration and distribution of the Canada goose in 1956 was similar to that of 1955 and 1954. Some early Canadas moved into Michigan in September but the first major movement occurred in mid-October with the geese entering the states of Minnesota, Wisconsin, Missouri, and Tennessee. On October 15th the northern tier of states and Missouri recorded their peak populations of 140,000 and 60,000 Canadas, respectively. The first major flight moved into Illinois in late October and by November 1st 104,000 Canadas were tallied there.

The flyway population peaked on November 15th when 404,000 Canada geese were recorded; an increase of 64,000 over the 1955 winter high. By December 1st Canada numbers had declined to an estimated 315,000 birds and the population then stabilized at that figure for the remainder of the 1956-57 inventory period. The Missouri flock reached peak numbers on October 15 this year as it did in 1955 but only 60,000 geese were recorded in 1956 compared to an estimated 110,000 the year before.

Illinois wintered a few more Canadas in 1956 than in 1955 and the migration pattern this season was practically the same as that of previous years.

Some difficulty was encountered in interpreting the 1956-57 census figures on Canadas because of daily movements of the southern Illinois flock into surrounding states. It was apparent that some geese were recorded by more than one state during some censuses because of slight differences in time of inventory. By considering only census figures obtained in southern Illinois duplication is avoided and large apparent fluctuations in Canada goose numbers disappear.

Illinois is by far the single most important wintering area for Canada geese in the Mississippi Flyway. Of the total flyway population on January 15th, 73% were found in Illinois. The remaining Canadas were located in Tennessee (7%), Alabama (7%), Missouri (6%), Michigan (3%), Louisiana (2%), and small numbers in other flyway states. Of the total flyway Canada population, inventory figures indicate that 4% winter in the northern tier of states, 16% in the southern region, and 80% in the central states.

BLUE AND SNOW GEESE

The blue and snow geese are species that have exhibited an almost unvarying migration and distribution pattern during the three years of inventory. Some blues and snows were moving in mid-October but the big flight passed down the flyway in late October and early November.

This year a portion of the flock was still to be found in the northern tier of states in early November and Missouri had 40,000 blues and snows as late as December 1st.

Ten thousand of these geese spent the winter in Missouri and Illinois this past year.

The peak blue and snow goose population of 480,000 on November 15th is not much different from the peak 470,000 recorded on the same date in 1955. Of this number 90% were blue geese.

The main wintering grounds of the blue and snow are in the coastal marshes of Louisiana where 97% of the 1956 flock wintered.

WHITE FRONTED GEESE

A migrant of the central flyway, these geese are rarely found in Mississippi Flyway states other than Louisiana. A few hundred white fronts pass through western Minnesota and Missouri during the migration period. The eastern fringe of this goose's range touches southwest Louisiana where some 12,000 were recorded on the November 15th inventory. This year's inventory indicates no change in numbers from that found in 1954 and 1955.

COOTS

The coot migration and distribution was almost identical to that observed in 1954 and 1955. The first wave moved into Minnesota in mid-September and by mid-October all parts of the flyway had received large flights of these water birds. Important states in the upper flyway during migration were Minnesota, Wisconsin, and Illinois.

Peak populations were observed in the northern and central tier of states in mid-October and by early November the main flight was passing through the southern states. Between November 1st and November 15th the north and central states lost 1,300,000 coots. From November 1st to December 1st the southern states population remained in the vicinity of a quarter of a million coots. Three possibilities present themselves: the more than a million coots passed down and out the flyway between inventories; the coots shifted to another flyway; or the southern population was in a constant turnover maintaining about the same total number of coots but made up always of different

individuals. It is suggested that the latter possibility is the more probable one since habitat conditions (drought) were such that buildups did not occur in the lower flyway. Coots prefer shallow fresh water areas occupied by dense stands of aquatic vegetation and where such is found in the lower flyway high wintering populations result. Under drought conditions such areas are reduced in size and number and this normally is reflected in a lower number of wintering coots.

The peak flyway population of 1,700,000 coots was recorded during the mid-October inventory and represented a 25% increase over 1955. By January 15th the coot population had declined to 172,000 and these birds were found largely in Louisiana (58%), Alabama (15%), Arkansas (13%), and Tennessee (9%).

For three years now the coot migration has been one of the most regular as to timing and distribution of flights. As suggested in the 1955 inventory report management could apply this information to regulate the coot kill by setting seasons to conform to the flight or to miss the flight as desired. It even appears that a differential harvest of coots could be accomplished in portions of the flyway if desired by use of selected opening dates.

FOOD HABITS OF WILD DUCKS IN THE RICE-MARSH TRANSITION AREA OF LOUISIANA

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INTRODUCTION

Several papers have been published on the food habits of wild ducks taken in widely scattered areas of the Gulf Coast. The general Gulf Coast area was summarized by Martin and Uhler (1939) in their study of 2,101 stomachs from 38 locations. Singleton (1953) analyzed 1,017 stomachs from the Texas Coast. These included 293 from the upper coast, 502 from the central coast, 120 from the lower coast, and 102 from inland lakes.

The present study is based on material obtained from hunting clubs in Cameron and Vermilion Parishes, Louisiana, from the fall of 1954 through the hunting season, January, 1957. The area considered in this paper is much smaller than the areas covered by Martin and Uhler or by Singleton. The points of collection are in one of the major waterfowl wintering grounds on the Gulf Coast.

The original objective was to study only *gullet* material from selected hunting sites within the area. The first season's collections showed heavy usage of the seeds from rice fields and fallow rice fields, although the collection locations were several miles from the rice growing area. It then seemed advisable to collect *stomachs* to supplement the gullet material and attempt a correlation of gullet studies with stomach studies as had been done by others (lit. cit.). It was felt that this was necessary since gullet material reflects recent consumption and stomach material may distort the food importance of some hard seeded plants. Both the gullet and stomach were taken from the same bird wherever possible. For this study the gullet material was anything contained in the area between the proventriculus and the mouth, and the stomach included the proventriculus and gizzard.

DESCRIPTION OF THE AREA

The collection areas were located in the Gulf Coast Marsh Resource Area and is classified as fresh marsh. The vegetative conditions have probably changed some from the original as a result of water control. Structures, such as control gates and levees, have been installed to insure having water on the areas in the fall of the year. The fall is usually dry through the middle of November in this portion of Louisiana.

The areas where collections were made include good stands of emergent plants, including *Scirpus*, *Cladium*, *Zizaniopsis*, *Sagitaria*, *Eleocharis*, and *Echinochloa*. These communities are interspaced with open water areas which produced sub-