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DUCKS ALONG THE DELAWARE

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(Illustrations by the author)

It is the purpose of this paper to present a picture of the duck population, from September 1943 through August 1944, along a stretch of the Delaware River. It is hoped that the data obtained during this period will serve for comparison with similar observations by others in the future. In this way trends in the local duck population can be correlated with the inevitable changes, both local and general, which time will bring about.

In some ways, perhaps, the present year was unusual as regards the number of ducks in the United States. The birds had had a good breeding season. The ranks of the duck-hunting fraternity may have been reduced somewhat by the war, and a scarcity of shotgun shells may also have decreased the yearly take of waterfowl. Newspapers carried reports, issued by federal authorities, of an estimated duck population of 150,000,000 in the autumn of 1943 and further stated that this figure had not been approached since 1900. A quotation from "Nature",¹ however, sheds some light on this:

"Many have wondered about the basis for the 1900 population figure, because this was long before the need for such figures was realized, or the regulation of shooting by international treaty considered. We have learned that the 150,000,000 estimate was made, not in 1900, but about 1929, and seems not to have been published until 1942. It is now cited in contrast with the estimated 25,000,000 in the dark days of 1932, and 38,000,000 in 1937.

"Experienced field observers, realizing how difficult it is to estimate continental waterfowl populations are seldom disposed to question total figures, but those who have vivid recollections of the great waterfowl flocks of the early nineteen-hundreds find it impossible to believe that the ducks are now as abundant as they were forty years ago, and consider it dangerous to publish such statements."

Whether or not there was an extraordinarily large number of ducks in the country as a whole, the autumn flight of 1943 was remarkably poor in New England and New York.² Although there are no figures available upon

¹ Nature Magazine, 37, no. 5,257, May 1944.

² Audubon Magazine, March-April, 1944. Ludlow Griscom, The Changing Seasons.

which to base an accurate comparison, the flight in the Delaware River area was probably at least normal. The truth or untruth of this last statement will be proved when others, in years to come, compare their figures with those which appear in the following pages. It may be of some interest, however, to compare some data obtained by Julian Potter in 1918 with the present census. In the year 1918 Mr. Potter made 48 trips to Fish House, on the Delaware River. This area comprises a bluff overlooking a cove on the east bank of the river about 4 miles above Camden. This same point was included in 22 trips on the present census between September 1943 and August 1944. A comparison of the two sets of figures follows:

1918. Number of trips, 48. Total number of ducks recorded, 1056. Total number of species of ducks recorded, 5. The species recorded were Black Duck, Pintail, Scaup, American Merganser, and Redhead.

1943-1944. Number of trips, 22. Total number of ducks recorded, 16,294. Total number of species of ducks recorded, 12. The species recorded were Mallard, Black Duck, Pintail, Baldpate, Blue-winged Teal, Shoveller, Redhead, Canvas-back, Scaup, Golden-eye, Bufflehead, and American Merganser.

Striking at once is the vastly greater population of the present. Also of interest is the greater number of species recorded in the more recent period. Further analysis reveals the following:

	1918	1943-44
Black duck	72	4,444
Pintail	17	9,766
Redhead	6	4
Scaup	452	698
American Merganser	437	59

It would appear justifiable, from these figures, to state that pintails and black ducks have increased in this area since 1918. It must be remembered, however, that in 1918 the prohibition of spring shooting had been in effect only a short time and that the shooting season still extended over a long period and far into the winter. Furthermore, conditions in the cove at Fish House have changed. In 1918 the cove was several times its present size and the water was much deeper. This favored such species as scaups and mergansers. The cove has now been reduced by "filling" operations and the remaining waters are more shallow, favoring such species as Mallards, Black Ducks, Pintails, Teal and Shovellers, while the Scaups and Mergansers seek deeper water elsewhere.

THE TERRITORY

The observations to be reported were made along the New Jersey side of the Delaware River from Fish House, 4 miles north of Camden, south to Salem, a stretch of river approximately 40 miles long. On 22 trips a complete

circuit over an identical route was made. Additional trips were taken which did not include the entire circuit. The trips were so distributed as to obtain data for every month in the year. The major points of concentration of waterfowl were found to be as follows:

1. Fish House; a shallow cove on the eastern bank of the Delaware 4 miles above Camden.
2. Westville; a cove a few miles south of Camden, at the mouth of Big Timber Creek.
3. White Bridge; an extensive cattail and wild rice marsh and pond along Woodbury Creek.
4. Along a stretch of the Delaware, off the mouth of Woodbury Creek, from National Park south about 2 miles to Paradise Point.
5. Paulsboro; a shallow and spatterdock-filled pond along Mantua Creek.
6. Bridgeport; two large ponds formed by an overflow from Raccoon Creek.
7. Pedricktown; an extensive wild rice marsh along Oldman's Creek.
8. Marshalltown; along Mannington Creek, a large stream bordered by spatterdock and cattails, with adjacent bogs and tributaries. Mannington Creek joins Salem Creek before its waters empty into the Delaware.
9. Salem; along Salem Creek, large flooded areas populated with cattails and wild rice.
10. Fort Mott; extensive wild rice and cattail marshes. Included in the area is the Killcohook Migratory Bird Refuge, formerly a big cattail and wild rice marsh, but now, unfortunately, rapidly becoming overgrown with phragmites as a result of "filling" operations.

The route followed on the 22 complete trips included each of the above 10 stations in the order given, usually between 9:00 A.M. and 5:00 P.M. On every trip the number of each species was counted at each of the stations. When flocks were encountered which were too large to be precisely counted estimates were made by one or both of the following methods:

1. One hundred birds were counted off and the "block" so obtained was used as a measuring rod to estimate 500 or 1000 birds. Then the 1000 "block" was applied to the rest of the flock.
2. The area covered by a flock was estimated in square yards and multiplied by the number of ducks per square yard, as well as the latter could be determined.

I should like at this point to express my appreciation to Julian Potter who accompanied me on most of the trips and who painstakingly estimated flocks with me. When two observers thus make estimates independently and check each other, no doubt the inevitable error is less than when only one person does it. One's ability to estimate flocks of birds improves with experience. By tediously counting the individuals in a sizeable flock, after having estimated it, one can check upon his accuracy from time to time.

THE GENERAL PICTURE

As would be expected the duck population along the Delaware reached its lowest ebb during the late spring and summer months. At this time our locally breeding species only were present; Black Ducks, and Wood Ducks made up the majority of these, with a few Mallards and Blue-winged Teal.

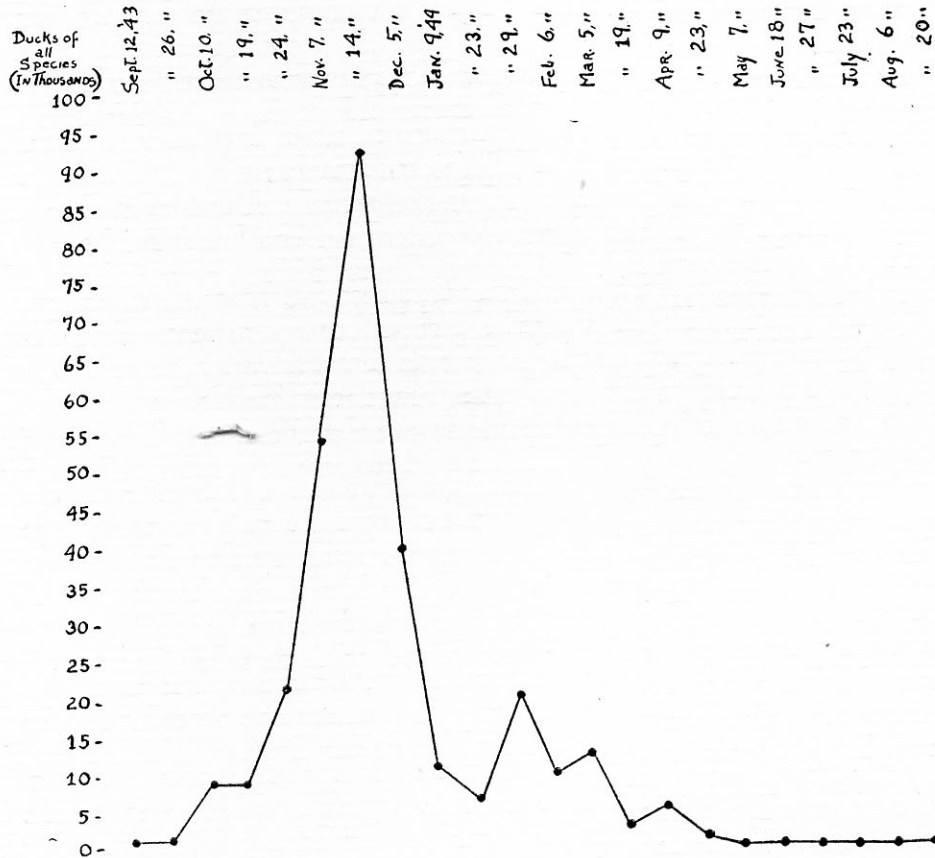


FIG. 1. A graph showing the numbers of ducks of all species seen on each of the 22 trips.

Early in September the southward movement began and Pintails, Baldpates, Shovellers, and migrating Blue-winged Teal swelled the population. In early October the Green-winged Teal arrived. In October also, the Greater and Lesser Scaups, Ringnecked Ducks, Golden-eyes, and Ruddy Kucks appeared. The population of waterfowl increased until mid-November and then fell rapidly as the birds moved on south in December and January. The spring rise in population apparently commenced in late January, extended through April and then fell quickly to the summer breeding level.

One of the most interesting results in an analysis of these records is the

vast discrepancy between the fall peak and the spring peak, as shown in Fig. 1. On November 14 over 90,000 ducks were recorded. The spring peaks did not approach this number. It is quite probable that many of the birds which follow the Atlantic coast route south in the fall return in the spring by central routes to their breeding areas in the northwestern and north central parts of the United States and Canada. One must also subtract those birds lost by the hazards of migration, including those shot by duck hunters. It may also

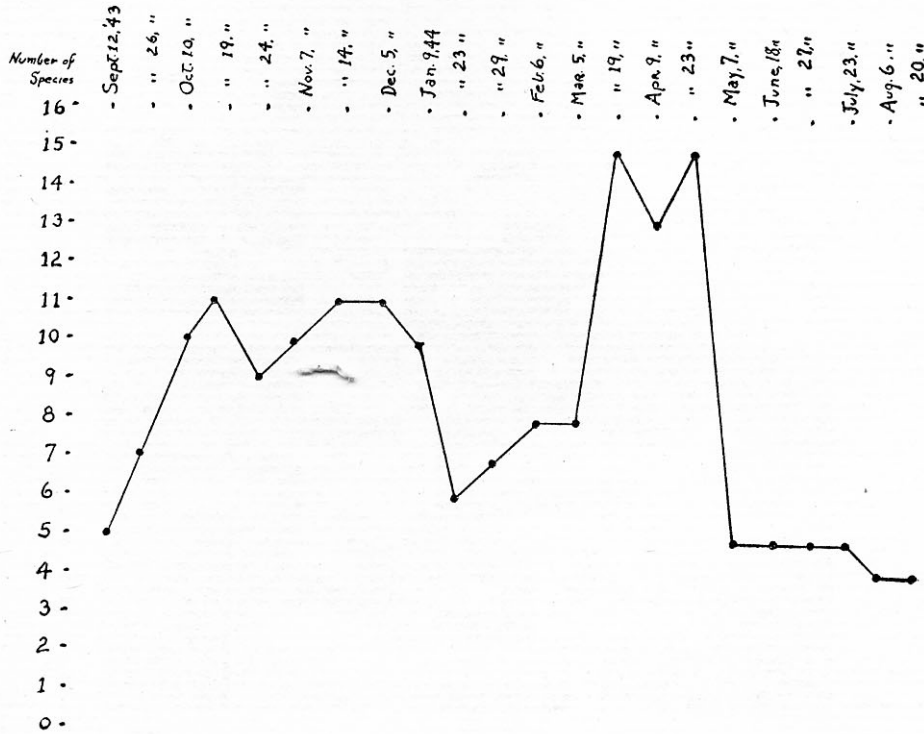


FIG. 2. A graph showing the number of species of ducks seen on each of the 22 trips.

be that in the spring the ducks pass through more quickly, not remaining to build up large concentrations in this region, and the spring migration may be distributed over a longer period. It remains true that if the total fall records are compared with the total spring records, the fall migration was much larger than that of the spring.

Another interesting point is revealed by totalling the numbers of each species seen on all trips. (See Fig. 3.) By adding the totals for each species the grand total of ducks recorded is obtained, 318,856 birds. These figures, of course, include individuals which were counted and re-counted as long as they remained in the area. Nevertheless, the figures are of value for purposes of comparison. For example, it will be noted that of the 318,856 ducks re-

American Merganser or the Ruddy Duck had arrived. In the spring, however, all of these species were present at the same time.

The local distribution of ducks also varied during the year. In the spring and in the early fall the birds were scattered throughout the best feeding areas. When the shooting season opened they became concentrated, during the day time at least, in protected areas, such as the Killcohook Refuge, or far out in the open river. Again there was a shift when the shallow waters froze over, forcing more birds into the deeper river. More intense cold sent many of the birds further south out of the area. During the breeding season very few ducks were found on the river, most of them being scattered throughout the secluded swamps and marshes along the tributary creeks. The extremely low population counts in the summer months are somewhat misleading since the birds are seeking seclusion and are scattered, the vegetation is dense and interferes with observation. Also, the observations were usually made between 9:00 A.M. and 5:00 P.M., when the birds are least active.

ANALYSIS BY SPECIES

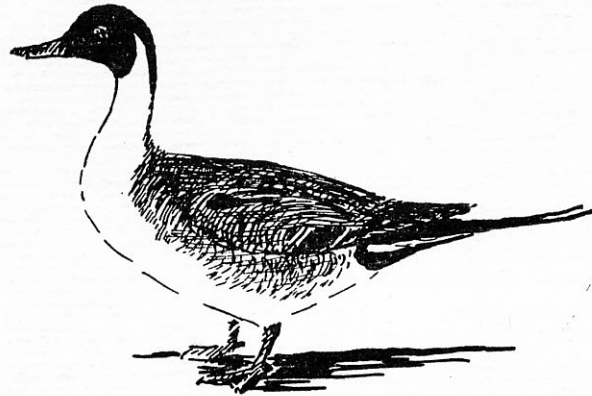
Mallard (*Anas platyrhynchos platyrhynchos*). This species is one of our year round residents. Its numbers were fairly constant throughout the year, reaching a high count of 116 on October 19, when migrants had no doubt augmented the local breeding population. Mallards were usually found in association with Black Ducks and Pintails. In the fall they were most numerous in the Killcohook Refuge and later in the winter in the Delaware off the mouth of Woodbury Creek. A breeding pair was located in the Bridgeport area and on June 27 a female mallard was seen escorting nine ducklings, six of which were Mallards and three of which were Black Ducks. All of the ducklings were about three-quarters grown and it is possible that they were hatched from a "mixed" nest.

Black Duck (*Anas rubripes tristis*). The Black Duck is our only other year round resident and is our most abundant breeding species. The lowest population in the territory was reached in June and July when the birds were most widely scattered. Only 27 were seen on June 27 and on July 23. On June 18 a flightless male with absent primaries indicated that the moulting period may aid in reducing the count since the birds seek seclusion at this time. The breeding period must extend over a considerable time, since I have records of downy young in April and a female incubating in July. The population of Black Ducks increased rapidly in October and reached its peak on November 14 when 26,665 were recorded. Thereafter the population decreased to a level of from one to three thousand until April when the spring migration pulled it up to 6,362 on the 9th. Following this the numbers sank to the breeding population. If their numbers are totalled for the year the Black Duck population was exceeded only by that of the Pintails. In the winter the greatest concentration of this species was in the Delaware between National Park and Paradise Point. Before the shallow waters froze over

large numbers of Black Ducks gathered in the Killcohook Migratory Bird Refuge.

Baldpate (*Mareca americana*). The Baldpate is an early fall migrant. Baldpates appeared early in September. On October 19, 2000 birds were recorded. This figure is far larger than the total number of Baldpates seen on all other trips combined and must have represented a tremendously concentrated wave of migrants. Their numbers thinned out during the winter, only one being seen on January 9 and none at all on January 23. During February a few Baldpates appeared and the spring flight reached its peak in April. A late straggler was recorded on May 7. Baldpates congregated on Mannington Creek where, in one cove, there was apparently a growth of widgeon grass. They were also found in fair numbers on the Killcohook Refuge.

Pintail (*Dafila acuta tzitzihoo*). When present in its fullest force this species far out-numbered all others in the area. Pintails arrived early in



PINTAIL

September and increased rapidly through October to reach their maximum concentration of 62,857 on November 14. They then sank to a winter low count of 2653 on January 9 and rose again in the spring to a peak of 10,497 on March 5. The fall migration was strikingly greater than the spring migration and surely the bulk of this species must migrate northward by inland routes. Birds seen on March 19 were pairing off and performing prenuptial antics. A pair of Pintails was recorded at White Bridge on May 14 which I hoped might remain to breed, but failed to see them again. The main flight had passed by April 23 when only 32 birds were seen. Occasional pairs of this species have been reported late in the spring and even in the summer in this region and it may be that a few of them do breed in the area, though to my knowledge no nests nor young have been observed to date. A large flock of Pintails gathered in the Killcohook Refuge during the early fall, 40,000 on November 7. Equally large concentrations were later found on the Delaware

off the mouth of Woodbury Creek. Pintails, however, were recorded at all of the stations visited during their stay.

Green-winged Teal (*Nettion carolinense*). It might be said, in general, that the Green-wing arrives later in the fall, stays later into the winter, arrives earlier and leaves earlier in the spring than does the blue-wing. A single Green-wing was recorded on September 25, and 4 on October 10; thereafter the birds increased to reach their peak of migration during the middle two weeks of November, the highest count being 2051 on November 14. Green-wings were absent during the middle of January when the weather was extremely cold. They returned late in January, reached a high count of 184 on April 9 and were gone from the territory by the end of April. An adult male, evidently failing for some reason to migrate, was seen on June 27 on the Killcohook Refuge in company with Black Ducks. The greatest concentration of Green-wings during their stay in this region was in the Fort Mott area.

Blue-winged Teal (*Querquedula discors*). This species is one of our earliest fall migrants. It is also a breeding bird, though in small numbers. Blue-wings arrived early in September. They were not numerous at any time, the largest count on any one day being 127 on October 19. Blue-wings left the territory after the middle of November and no more were recorded until March 12. The highest count of the spring flight was 69 on April 23 after which date only birds which were evidently breeding here remained. A family group consisting of a pair of adults and 4 downy young were seen on Mannington Creek June 18. A female with 6 downy young was seen July 23 on the Killcohook Refuge. Blue-wings usually congregated on the Killcohook Refuge, on Mannington Creek and at White Bridge, though a few were found scattered throughout the territory.

Shoveller (*Spatula clypeata*). The first Shovellers were seen on September 26. The largest number recorded on a single trip was 101 on October 24. No Shovellers were seen during January and only one before the middle of March. As with most species, the numbers in the spring flight were less than in the fall. No Shovellers were recorded in May, June, July and August. The times of arrival and departure of this species are quite similar to those of the Blue-winged Teal. It should also be noted that both species nest in the Bombay Hook, Delaware, region, south of the territory under consideration. I have a record of a female Shoveller at Fort Mott in July, 1943, suggesting the possibility that occasional Shovellers may breed in this locality. The largest concentrations of Shovellers occurred in the Killcohook Refuge, though Mannington Creek was also a favorite locality for this species and scattered individuals were found throughout the territory.

Wood Duck (*Aix sponsa*). The Wood Duck is one of our four breeding ducks, but its numbers are very low. By mid-October most of the Wood Ducks had left the region and they did not reappear until the middle of March. The highest number recorded was 21 on June 27 and most of these were young of the year. Their favorite breeding sites were near Paulsboro and along

Mannington Creek. An adult male was seen in partial eclipse plumage on June 27. I believe that this species has been sadly reduced by withdrawing the protection it was formerly given. It is difficult to understand why an open season was declared on the Wood Duck, when its numbers, in the eastern United States at least, still constitute but a pitiful remnant of its former population. It was bad judgment or ignorance of the true status of the species to withdraw its protection.



WOOD DUCK

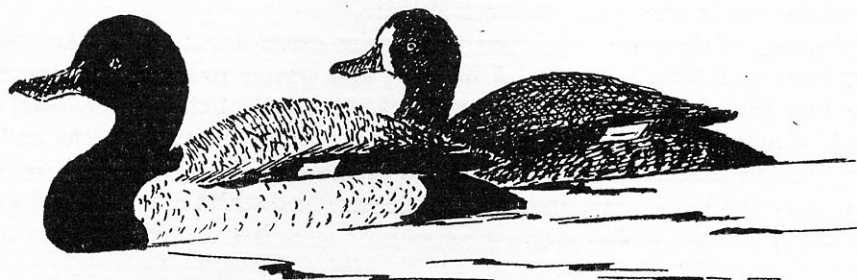
Redhead (*Nyroca americana*). Only 5 Redheads were recorded during the year. One of these was seen on January 9 off the mouth of Woodbury Creek with Pintails and Black Ducks. Four were seen at Fish House on March 19 in company with Greater Scaups. Redheads are uncommon in the Delaware Valley, but are usually seen north of the present territory at Penn Manor, or at the Springton reservoir, near Media, Pa., some time during the winter.

Ring-necked Duck (*Nyroca collaris*). More Ring-necked Ducks were recorded in the spring than in the fall, the reverse of all other species except the scaups. Only one bird was seen in the fall and that on November 14. In the winter one was recorded on February 6. In the spring 20 were seen on March 19, 18 on April 9 and 4 on April 23. Thereafter the species was absent. Most of the birds seen were on the overflow of Raccoon Creek at Bridgeport. North of the territory included in this study I recorded 150 on February 20 at Penn Manor and in the same locality Manners reported 1000 on March 26.

Canvas-back (*Nyroca valisineria*). Within the territory covered by this report, an adult male Canvas-back was seen on October 19 at Mannington Creek. Nine were seen on January 9 and 2 on March 19 at Bridgeport. The Canvas-back is seen each year along the river, but this is not in general a good territory for it. Canvas-backs are more numerous further north at Penn Manor, probably due to the planting of wild celery by the local gun club. I recorded 50 there on October 31.

Greater Scaup (*Nyroca marila*). This bird arrived in the territory late in October and remained throughout the winter, though its numbers were low from December until the middle of March. More were seen in the spring flight than in the fall. The largest number recorded on a single trip was 500

on April 9. By the end of April the flight had passed on northward. The largest concentrations of Greater Scaup were in the cove at Fish House and in the river off the mouth of Woodbury Creek.



GREATER SCAUP

Lesser Scaup (*Nyroca affinis*). Only 13 birds were recorded in the fall, 11 on October 19 on Salem Creek and 2 on November 7 at Mannington Creek. No more Lesser Scaups were seen until March. All of the spring records were at Bridgeport and the birds left there by the end of April. The largest number seen on any one day was 20 on April 9. A non-migrating male was seen at Westville and at Fish House through June and July. Lesser Scaups were more common in the spring than in the fall, though they were not numerous at any time.

Golden-eye (*Glaucionetta clangula americana*). Golden-eyes were seen as early as October 10 and scattered records were obtained throughout the winter, the last pair being noted on April 23. The largest number seen on one trip was 22 on January 9. While they are here Golden-eyes may be seen almost anywhere along the river, though I find them more common north of the territory studied, especially from Beverly to Palmyra.

Buffle-head (*Charitonetta albeola*). This species, like the Golden-eye, is perhaps more numerous just north of the territory covered by this report. My records within the territory are distributed from November 14 to April 23. The Buffle-head is far from abundant and sorely needs protection. Most of the records within the area under consideration came from Fish House, Bridgeport and in the Delaware off Woodbury Creek.

Old-squaw (*Clangula hyemalis*). Old-squaws were recorded on only 2 trips, 6 on January 9 and 10 on January 29, in the Delaware River off Paradise Point. The vast majority of this species, of course, migrates along the sea coast. It is not common in the Delaware.

Ruddy Duck (*Erismatura jamaicensis rubida*). Ruddy Ducks appeared in late October, remained until January and were not seen again until April. The bird was last recorded on May 7. Sixty Ruddies were seen on April 9. Most of the Ruddy ducks seen were in the Delaware off Woodbury Creek, though some were found at Bridgeport and an occasional one elsewhere within the territory.

Hooded Merganser (*Lophodytes cucullatus*). Seven Hooded Mergansers were seen at the Killcohook Refuge on November 21 by Miller et al. I have a few records for other years within the territory, but the bird must be considered as rare in the valley of the Delaware.

American Merganser (*Mergus merganser americanus*). The American Merganser is distinctly a late fall migrant and winter resident. It first appeared on December 5. The birds remained throughout the winter, reaching a peak population of 729 on February 6, and left the territory by the end of April. While here they were found at all of the stations, wherever there was open water and fish to feed upon. I believe this bird starts moving northward very early, perhaps in January.



AMERICAN MERGANSER

Red-breasted Merganser (*Mergus serrator*). This bird, preferring the salt water and brackish bays, is not common in the area here included. Only once during the year was it recorded, a flock of 30 on December 5 at Mannington Creek. In recent years I have recorded a few of them along the river, more commonly in the spring than in the fall.

SUMMARY

A one-year study of the duck population along a forty mile stretch of the Delaware River, from Fish House to Salem, has been reported, with the hope that it may serve for comparison with similar studies by other observers in the future. A general picture of the yearly movements of the waterfowl in this region has been presented, together with an analysis of the migratory periods and local distribution of each of the twenty species recorded.