

# BACK BAY-CURRITUCK SOUND DATA REPORT



## Waterfowl Studies

COOPERATIVE STUDIES 1958 - 1964

BY: BUREAU OF SPORT FISHERIES AND WILDLIFE  
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Back Bay-Currituck Sound Data Report-Waterfowl Studies - Volume II

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## INTRODUCTION

The primary objectives of the waterfowl studies, done **in** conjunction with the overall ecological investigation of Back Bay, Virginia, and Currituck Sound, North Carolina, from 1958 to 1964, were to document the magnitude and nature of the reported decline in waterfowl use, the present waterfowl use, the trends in waterfowl harvest, the factors affecting waterfowl use of the area, **and to** estimate the potential carrying capacity of the area.

The data were obtained by literature and report review, periodic waterfowl inventories, compiling hunting club records of waterfowl kill, food habits studies, and the vegetation studies reported on in Volume 1 of this basic data report. Also all waterfowl band recoveries through 1961 were compiled and mapped.

### HISTORICAL ACCOUNTS OF WATERFOWL USE OF BACK BAY AND CURRITUCK SOUND.

#### Literature Review

The reliability and accuracy of estimates of waterfowl use are always **open** to question, however, some insight into historical waterfowl use of Back Bay and Currituck Sound can be found in **Dunbar's** literature review "Geographical- History of the Carolina Banks." The following excerpts, mostly from **Dunbar's** review, are of particular interest:

(1) "It has been said that the closing of Currituck Inlet [1828] resulted in profound changes in the vegetation of the Sound and a consequent great increase in the waterfowl population., Chapelle (1951)."  
**Dunbar** (1956).

(2) "However, it may be that the increase was not so great, and that the closing of the inlet just coincided with the beginning of waterfowl exploitation on the Atlantic Seaboard. Chapelle (1951)."  
**Dunbar** (1956).

(3) "Northern sportsmen were beginning to invade the Chesapeake, and, in the 1850's, a few came to Currituck Sound. Chapelle (1951)."  
**Dunbar** (1956).

(4) "The period of great exploitation of waterfowl in Currituck Sound by market hunters and sportsmen was to follow the Civil War." **Dunbar** (1956).

(5) "About 1856 Ruffin described market hunting in Princess Anne County, Va., on **Back** Bay, the northern continuation of Currituck Sound. One **farmer** in Princess Anne hired thirty gunners each winter. 'Even northerners, as a regular business, come on every winter, to Princess Anne and elsewhere, to shoot wildfowl, and sell them to the northern cities.' Ruffin; op. cit., 153-154. Ruffin said that there was market hunting also in Currituck County, but he did not elaborate on that statement." **Dunbar** (1956).

(6) The following excerpt from the Southern Planter (1857) states "Edgar Burroughs, farmer of Princess Anne, on Long Island, Back Bay, hires 20 men to kill waterfowl and deliver them to Norfolk. From the beginning of the season to December 30, 23 kegs of gunpowder and shot in proportion consumed. Waterfowl were brought to Norfolk once a week and piled up in the warehouse of Kemp and **Bucky**; 15 to 25 barrels were shipped each Wednesday to New York - highest shipped in one week - 31 barrels. Kinds **shipped** - canvasback, redhead, mallard, black duck, sprigtail (pintail), **bullneck** (ringnecked duck), baldpate, shoveler, etc., to which may be added a good proportion of wild geese." Anonymous (1857).

(7) "**Ruffin**, op. cit., 1856, said 'Since the complete closing of **Currituck** inlet, in 1828, and the water has become fresh, changes have been gradually effected in most of the productions. One of the most important was in affording new and remarkable attractions to wildfowl of passage. Three or more different kinds of fresh water grasses, soon began to grow on the bottom of all the shalloer waters....' "**Dunbar** (1956).

(8) "Did the waterfowl population really expand greatly after the closing of the inlet? Unfortunately there are no first-hand accounts to settle this problem. An important factor to consider is that duck shooting, for market and sport, was really just beginning elsewhere in the East.

"An indication that duck shooting was increasing in northeastern North Carolina even before the closing of Currituck Inlet was a law enacted by the General Assembly in 1822 entitled 'An act to prevent the **fire-hunting** of fowl in Currituck County.' The Laws of North-Carolina, Enacted in the Year 1822 (Raleigh: Bell and Lawrence, **1823**), 72, Chap. 130. An act such as this indicates that something more than shooting for home consumption had commenced." **Dunbar** (1956).

(9) "The hunting of waterfowl for market became a leading occupation on Currituck Sound just after the Civil War and continued until 1918, when the Migratory Bird Treaty Act made the sale of migratory waterfowl illegal. (Critchler, **1949**)."**Dunbar** (1956).

(10) "Until October 1, 1913, there was no limit to the number of waterfowl an individual could kill, and some amazing records were established before that time. (Critchler, **1949**)."**Dunbar** (1956).

(11) "Supposedly the record kill was made by Russell and Vann Griggs, who shot 892 ruddy ducks in one day. (Critchler, **1949**)."**Dunbar** (1956).

(12) "There were virtually no restrictions on the equipment used in the early days, Until about 1884 muzzle-loaded shotguns were used, but after that time the double-barreled breech loader was more common. (Critchler, **1949**)."**Dunbar** (1956).

(13) "From 1903 to 1909 about 400 Currituck men turned to duck hunting in the winter, and their total annual earnings averaged about \$100,000. (Pearson, op. cit., 117)." **Dunbar** (1956).

(14) "In 1911, William Tate of Kitty Hawk estimated that about 350 to 400 people in Currituck County engaged in hunting for a living, but he also stated that there were more engaged in fishing. (Pratt, op. cit., 106)." **Dunbar** (1956).

(15) "Critchler, op. cit., 36, gives a good summary (of prices paid for waterfowl). "The price received by the local gunners for their kill varied, depending on the species, abundance, and time of year. Redheads and **cavasbacks** at times brought as much as \$2.50 to \$4.00 a pair late in the season. Earlier they sold for \$1.50 to \$2.00 a pair. Ruddy ducks usually brought from \$0.50 to \$1.25 a pair. Sometimes four individuals of this species were counted as a pair. At times, however, ruddy ducks brought as little as \$0.05 each, or as much as \$2.85 a pair. Marsh ducks, or common ducks, varied from \$0.35 to \$1.00 a pair. Canada geese were not in great demand and usually sold from \$0.25 to \$0.40 each. A swan sold for about \$0.50." **Dunbar** (1956).

(16) "H. H. Brimley noted the following prices in 1884: 'The following are the approximate prices the gunners were getting for their fowl, cash on the-spot by the regular buyers, all prices per pair except as noted otherwise; Canvasback, \$1.00; Redhead, 50¢, "common duck" 30 cents; small ducks, as Teal, Ruddy, Bufflehead, etc., 25 cents, with four ducks constituting a pair.' Canada geese brought 50 cents each." **Dunbar** (1956).

It **can** readily be seen, an average price per duck would be difficult to determine. If, arbitrarily, we assume \$0.25 was the average price per bird-and compute an estimated number of birds from Pearson's estimate of \$100,000 annual income from sale of waterfowl between 1903 to 1909, the astounding estimate of 400,000 annual kill of waterfowl is derived.

(17) "Wildfowl shooting for sport gained great popularity after the Civil War. Currituck Sound became a favorite resort of wealthy sportsmen." **Dunbar** (1956).

Hunting club Records of Waterfowl Harvest on Back Bay, Virginia, and Currituck Sound, North Carolina, from 1872 through 1963..

From 1872 on we can substantiate the trends in waterfowl kill by sportsmen by one of the most unique records of kill of any game species in the **county**. Ten major waterfowl hunting clubs **generously made their** records available to the study. The compilation of these extraordinarily **well-**kept and recorded data on waterfowl species kill per man-day of effort since 1872, presents a total kill of 517,229 ducks and 56,141 Canada geese by 51,668 man-days of effort.

Individual identities of club records are protected because all 10 have been compiled into one record. The clubs that contributed their records were: Sandbridge, Pocahantas, Horne Point, Currituck Gunning and Fishing Club, Currituck Club, Swan Island, Monkey Island, Pine Island, Whale Head (Corolla), and Dews Quarter Island.

Naturally, some error exists in the records because of hunter inability to identify waterfowl. But the identification of waterfowl by club hunters in the Back Bay-Currituck Sound Area is excellent. The frequent use of experienced guides and club managers is no doubt largely responsible for this ability. No attempt has been made to refine these records by arbitrarily listing unidentified waterfowl by species, or by calculating man-days of effort for any club in periods when it was not listed. Thus, totals by species will not always be equivalent to group totals, e.g., total dabbler, total ducks, etc.

Only comparable data are used to calculate kill per man-day by species or by group. For example, **one club** listed kill by species from 1908 to 1938, but not the man-days of effort. Therefore, in calculating the kill per **man-day** for all clubs the records of the one club were excluded. However, in tabulations of total waterfowl kill at all clubs the records were included.

The table on waterfowl kill per man-day shows an upward trend in duck kill from 1872 to a high from 1885 to 1925; the average annual kill of ducks per man-day ranged from 11.28 to 25.20. The maximum average annual kill of **dabbling** ducks per man-day was 20.53 in 1901. The maximum average annual kill of diving ducks per man-day was 6.37 in 1887.

After 1927 the duck kill per man-day fell below 10, and progressively declined. Smaller bag limits contributed to this decline. The lowest average annual kill of ducks per man-day was 1.64 in 1962.

The Canada goose kill per man-day increased slightly from 1872 to about 1893. A high kill rate extended from 1893 to about 1938, followed by a general decline. The greatest average kill of about three geese per **man-day** occurred in 1909. The lowest average kill of 0.18 **geese per man-day** occurred in both **1947 and 1958**.

There has been a fairly progressive increase in the man-days of effort,

#### Trends in Kill by Species

The kill of each waterfowl species per **man\*day** has been grouped by 5 year periods to smooth the trends.

The average kill of mallards increased after 1874 to a peak of almost four per day in the period 1899 to 1903. It declined to a low of 0.12 per day in 1944-48, and then increased slightly.

The black duck kill per man-day increased after 1874 to a high of about six per day from 1899 to 1918. The peak period was 6.65 from 1899 to 1903. After 1918 it declined to a low of 0.24 in the period 1954-58.

The average kill of **gadwall** increased from 0.19 in the period 1874-78, to a high 25 year plateau from 1899 to 1923. The highest average kill of almost one **gadwall** per day occurred in the period 1914-18. The lowest average kill of **gadwall** was 0.09 in the period 1959-62.

The average kill per day of baldpate reached a peak of 3.61 in the period 1894-98. Then the average kill generally declined to the low of 0.52 in the period 1959-62.

The fewest number of **pintail** killed per man-day was 0.29 in the period 1874-78. The kill increased to a peak of about four per day in the period 1919-23. It gradually declined to about 1943, and since then has rapidly declined to the second lowest rate of 0.35 **pintail** in the period 1959-62.

The average kill of teal, predominantly green-winged teal, increased to a peak of 0.91 per man-day in the period 1909-13, then declined to the low of 0.16 per man-day in the period 1959-62.

The average kill of shoveler erratically increased to a peak of 0.28 per man-day in the period 1914-18. A rapid drop to 0.05 occurred in the period 1919-23, and the kill per man-day has further declined to 0.01 in the period 1959-62. Possibly this sudden decline in the average kill per day resulted from hunters being more selective when bag limits were first imposed, and then made more restrictive.

The average kill of redhead ducks per man-day reached a peak of 0.53 in the period 1879-83. **Until** 1948 the kill per day fluctuated. Because of closed seasons and possibly few redhead ducks the two periods of lowest kill per man-day were 1934-38 and 1959-62, when only 0.05 and 0.00 redheads per day, respectively, were recorded.

The highest average kill of canvasback per man-day was 1.22 in the period 1874-78. The trend in kill declined to a low of 0.07 canvasback per man-day in the period 1889-93, then generally increased to a second peak of about 1 per man-day from 1914 through 1923. It declined to a low of 0.04 per man-day in the period 1934-38. Closed seasons and possibly lower populations were responsible for this low kill. During the period 1939 through 1948, the kill ranged from a low of 0.24 to a high of 0.31 canvasback per day. Closed seasons in the period 1959-62 resulted in no reported kill of canvasback.

Locally the term blackhead is applied to both **ringneck** and **scaup** and most of the club records did not differentiate. The average daily kill per man-day has fluctuated frequently, ranging from a high of 0.81 in the period 1884-88 to 0.13 in the period 1894-98. The second highest average daily kill of 0.66 occurred in the period 1939-43.

Pew coot were reported in the club records.,, possibly representing an indifference or general disregard for coot, rather than the true kill.

Snow geese never were harvested in any significant quantity for the highest average **daily -kill over a 5 year period was only** 0.01.

Whistling swan were also lightly harvested. The highest average swan kill per man-day was 0.18 in the period 1909-13. Since 1918 it has not been legal to kill swan.

Waterfowl Harvest Estimates for Currituck Sound, 1947 through 1955.

Critcher and Barber sampled the waterfowl kill per hunter at Poplar Branch from 1947 through 1955, for the North Carolina Wildlife Resources Commission. Based on the proportion of the total days in the hunting season that were sampled, the average success per hunter, and the assumption that one-sixth of total **kill on Currituck Sound passed through Poplar Branch;** they estimated the total kill for Currituck Sound. Using their data and methods I have estimated the total man-days of hunting.

<u>Year</u>	<u>Hunter Days</u>	<u>Waterfowl Killed</u>	<u>Ducks Killed</u>	<u>Geese Killed</u>	<u>Coots Killed</u>
1947-48	4,375	15,882	9,012	1,006	5,864
1948-49	5,072	30,384	10,854	2,080	17,448
1949-50	6,424	26,982	<b>10,086</b>	2,377	14,518
<b>1950-51</b>	8,963	36,750	15,954	3,496	17,300
1951-52	11,222	26,034	12,905	2,132	10,997
1952-53	9,696	25,210	10,181	6,884	8,145
1953-54	7,006	15,834	10,299	1,471	4,064
1954-55	8,585	27,300	19,831	<b>4,893</b>	2,576
1955-56	8,719	41,940	23,541	3,662	14,737

They estimated that 10 percent of the birds brought through the station were not checked, and considered this in the estimate. They assumed that the kill throughout the season was at the same rate as on the days on which checks were made.

The mail survey of waterfowl harvest in 1959 and 1960 indicated **7,008** and 13,416 man-days of hunting, respectively, in Currituck Sound, so the range of **4,375** to 11,222 man-days of hunting in the period 1947 through 1955 seems feasible.

Comparison of the rate of harvest by the field checks of Critcher and Barber with the club records from the same period reveals the following:

	Ducks/ man-day		Geese/ man-day		coot/ man-day		Waterfowl/ man-day	
	Field	Club	Field	Club	Field	Club	Field	Club
1947-48	2.06	2.94	0.23	0.18	1.34	0.10	3.63	3.22
1948-49	2.14	3.79	0.41	<b>0.57</b>	3.44	0.66	5.99	5.02
1949-50	1.57	3.34	0.37	0.62	2.26	0.55	4.20	4.51
1950-51	1.78	3.26	0.39	0.64	1.93	0.41	4.10	4.31
1951-52	1.15	3.21	0.19	0.38	0.98	0.24	2.32	3.83
1952-53	1.05	3.04	0.71	0.74	0.84	0.51	2.60	4.29
1953-54	1.47	3.04	0.21	0.55	0.58	0.44	2.26	4.03
1954-55	2.31	3.54	0.57	0.29	0.30	0.08	3.18	3.91
1955-56	2.70	4.55	0.42	0.28	1.69	0.14	4.81	4.97

Of course the area sampled by the club records includes Back Bay, whereas the field checks do not. The better success in all years on the duck kill, and in most years on the kill of Canada geese was to be expected, for the hunting club properties are on the best waterfowl habitat.

Although the club records are somewhat biased because of the favored location of the clubs, I consider them a better sample of the rate of kill for ducks and geese than the field checks run at Poplar Branch. The clubs are distributed throughout the entire area, their records represent the entire season, and the number of man-days sampled is greater. The field checks are localized, and in several instances represent as few as 4 days from a hunting season.

#### Waterfowl Harvest on Back Bay and Currituck Sound during the 1958-59 Hunting Season.

In the first year of the study, prior to expansion of the U.S. Fish and Wildlife Service Mail Survey of Waterfowl Kill and obtaining the hunting club records, bag checks were conducted on 13 days throughout the entire area to estimate the season kill of waterfowl. **Supplemental** information on the proportion of the total blinds occupied, the number of hunters per blind, waterfowl weights, etc. was obtained.

The average number of active hunters per blind varied from 2.00 to 2.86, with a seasonal average of 2.51 hunters per occupied blind. Four hundred and twenty-one hunters were checked in 168 blinds and they had killed 328 ducks, 89 Canada geese, and 58 coots for a total of 475 waterfowl. The principal ducks killed and the percentages they comprised of the duck kill were: baldpate 41 percent, ruddy duck 15 percent, ring-necked duck 9 percent, redhead 6 percent, mallard 5 percent, black duck 4 percent, **pintail**, lesser **scaup** and canvasback each almost 4 percent, and the remaining species lesser percentages.

The daily kill was estimated each day a bag check was conducted on the basis of the proportion of blinds checked to total blinds and the average kill per blind.

The season kill was estimated on the basis of averaging the kill between two adjoining daily checks and weighting the average by the number of hunting days intervening. The estimated waterfowl kill was 15,814 birds, consisting of 13,070 ducks, 1,244 Canada geese, and 1,500 coots.

**While this** method provided a wider distribution of sampling in the area, sampling throughout the season, and estimates of varying rates of seasonal harvest that were better than the earlier checks in North Carolina from 1947-55, the bag checks were taken sometimes before the hunt was concluded. This of course biased the seasonal estimates on the low side.

A second method of estimating the total kill is to estimate the man-days of hunting based on the number of hunters per blind, and the proportion of the blinds occupied on any of the 13 checks. Of 899 blinds checked through the season, 168 or 18 percent were occupied. Of an estimated 887 blinds constructed, about 160 were occupied per check. There were about 40 possible hunting days because of ice. Proportionally weighting the number of occupied blinds by the intervening **hunnable** days throughout the season we estimate **about 4,000** blind-days.. With an average of 2.5 hunters per blind the estimated man-days were 10,000. The weighted average of 3 ducks per hunter from club records of 1,185 hunters and 0.78 ducks per hunter from 421 field checks is **2.4** ducks per hunter. This would indicate a kill of 24,000 ducks in 1958.

**The** average number of geese per hunter in the club records was 0.18 per man-day, however, 0.21 per man-day were shown in the field checks. Based on the respective hunting days the weighted average was 0.187 geese per hunter. This would represent 1,870 Canada geese in the bag.

Based on a similarly weighted average of 0.117 coot per man-day, the estimated kill was 1,170.

Admittedly, both methods of estimating the kill in 1958 are crude; the range of the estimates by the two methods were: ducks 13,070 to 24,000; Canada geese 1,244 to 1,870; coots 1,170 to 1,500. The accuracy of these estimates **is** probably at least comparable to the earlier checks in North Carolina and the later estimates by the mail survey.

The estimated kills of ducks in 1959 and 1960 from the mail survey were 24,486 and 24,224, respectively. Corresponding estimates of Canada goose kill in 1959 and 1960 were 6,081 and 5,008.

#### Mail Survey of Waterfowl Harvest on Back Bay and Currituck Sound, 1959, 1960.

Prior to a change in procedures in 1961 in conduct of the U.S. Fish and Wildlife Service Mail Survey of Waterfowl Kill, it was possible to estimate the local kill of waterfowl on Back Bay and Currituck Sound, The Virginia and North Carolina Game Commissions contributed financially to an expanded survey during the winters of 1959 and 1960.

The accompanying table presents the waterfowl harvest statistics for both areas and permits comparison to the Atlantic Flyway. As shown in this table the waterfowl kill on Back Bay and Currituck Sound was as follows:

<u>1959</u>	<u>Ducks</u>	<u>Geese</u>	<u>coot</u>	<u>Total</u>
Back Bay	9,048	2,498	100	11,646
Currituck Sound	<u>15,438</u>	<u>3,583</u>	<u>400</u>	<u>19,421</u>
Total	24,486	6,081	500	31,067

<u>1 9 6 0</u>	<u>Ducks</u>	<u>Geese</u>	<u>coot</u>	<u>Total</u>
Back Bay	8,125	1,502	200	9,827
Currituck Sound	<u>16,099</u>	<u>3,506</u>	<u>2,021</u>	<u>21,626</u>
Total	24,224	5,008	2,221	31,453

Despite the fact that in 1959 and 1960 the man-days of hunting was only 1.96 percent, and 2.38 percent of the total in the Atlantic Flyway, the Back Bay-Currituck Sound waterfowl kill constituted 3.59 and 3.01 percent, respectively, of the kill in the flyway. Also, the kill in the study area comprised 15.59 and 7.32 percent of the Canada geese harvested in the flyway in 1959 and 1960, respectively. Although reportedly poor for Back Bay and Currituck Sound the harvest was considerably above the average for the Atlantic Flyway.

In descending order the ducks killed in greatest numbers in these 2 years on the study area were baldpate, black duck, green-winged teal, **pintail**, mallards, ruddy duck, and ring-necked duck. We consider that the estimate of the kill of scaup was too high, because the periodic inventories indicated scaup were scarce in the area.

#### Comparison of Club Records to Mail Survey of Waterfowl Kill

Comparison of the mail survey data from 1959 and 1960 with the club records reveals slightly higher average daily kills in the club records, as would be expected. The mail survey indicated average kills of ducks per man-day of 1.81 and 1.73 in 1959 and 1960, respectively, on the entire area. The club records indicated corresponding kills of ducks of 2.04 and 2.20.

The two surveys showed better agreement on the average daily kill of Canada geese with 0.45 and 0.35 indicated by the mail survey and 0.47 and 0.32 indicated by the club records in 1959 and 1960, respectively.

The man-days of hunting for the 2 years in the entire area were 13,546 and 17,106 on the mail survey. The club records represented 1,140 and 1,256 in 1959 and 1960, respectively. Thus 8.4 and 7.3 percent of the estimated man-days of hunting were sampled in the club records in 1959 and 1960, respectively. The club records average about 8 percent of the total hunting in recent years.

Table . Waterfowl Harvest Statistics for the Atlantic Flyway, Back Bay, Virginia, Back Bay, Virginia, and Currituck Sound, North Carolina, for the Hunting Seasons of 1959-60 and 1960-61 as Determined by the U. S. Fish and Wildlife Service Mail Survey of Waterfowl Kill.

	Atlantic Flyway		Back Bay, Virginia		Currituck Sound		Back Bay		Back Bay-Currituck	
	1959-60	1960-61	1959-60	1960-61	1959-60	1960-61	1959-60	1960-61	1959-60	1960-61
			North Carolina		Currituck Total		Percent of Flyway			
Mallard	120,734	151,313	789	819	1,067	1,401	1,856	2,220	1.54	1.47
Black	177,488	217,582	1,315	1,324	1,791	2,029	3,106	3,353	1.75	1.54
Gadwall	4,008	4,216	96	178	337	306	433	484	10.80	11.48
Baldpate	22,633	29,397	2,115	1,225	2,698	4,170	4,813	5,395	21.27	18.35
Pintail	22,729	26,217	741	612	1,625	1,964	2,366	2,576	10.41	9.83
Greenwing Teal	35,457	52,013	872	805	1,799	1,819	2,671	2,624	13.27	5.04
Blowwing Teal	22,824	23,271	96	285	434	386	530	671	2.32	2.88
Shoveler	2,325	3,560	48	71	123	145	171	216	7.35	6.07
Wood Duck	73,511	93,094	287	306	179	177	466	483	0.63	0.52
Total Dabbler:	481,709	600,663	6,359	5,625	10,053	12,307	16,412	18,022	3.41	3.00
Redhead	7,008	1,675	311	29	358	1	669	30	9.55	1.79**
Canvasback	15,237	5,672	382	14	483	48	865	62	5.68	1.09**
Ringneck	16,436	17,834	335	385	1,012	1,063	1,347	1,448	8.20	8.12
Scaup	55,609	48,897	908	676	705	612	1,613	1,288	2.90	2.63
Goldeneye	19,579	20,245	72	7	14	177	86	184	0.44	0.90
Ruddy	5,440	13,197	84	1,040	398	1,047	482	2,087	8.86	15.81
Bufflehead	21,031	27,172	215	50	576	435	791	485	3.76	1.78
Total Divers:	140,340	134,692	2,307	2,201	3,546	3,383	5,853	5,584	4.17	4.15
Merganser	24,944	23,636	179	249	93	32	272	281	1.09	1.19
Other Duck	2,339	8,302	0	0	279	29	279	29	11.93	0.35
Scoter	32,396	41,866	203	50	1,467	258	1,670	308	5.15	0.74
Total Duck	681,728	809,159	9,048	8,125	15,438	16,099	24,486	24,224	3.59	2.99
Canada Geese	38,996	68,395	2,498	1,502	3,583	3,506	6,081	5,008	15.59	7.32
Coot	16,133	34,779	100*	200*	400*	2,021	500*	2,221*	3.1 *	6.4 *

\* Partial estimate

\*\* Illegal kill

Table . Comparison of the 1959-60 and 1960-61 Waterfowl Harvest Statistics for Back Bay, Virginia, and Currituck Sound, North Carolina, with that of the Atlantic Flyway--as Determined by the U. S. Fish and Wildlife Service Mail Survey of Waterfowl Kill.

	Atlantic Flyway		Back Bay, Ya.		Currituck Sound, North Carolina		Back Bay Currituck Total		Back Bay-Currituck Percent of Flyway	
	1959-60	1960-61	1959-60	1960-61	1959-60	1960-61	1959-60	1960-61	1959-60	1960-61
Active Hunters	200,969	192,996	2,043	1,153	2,336	2,873	4,379	4,026	2.18	2.09
Successful Hunters	--	--	1,315	826	1,969	2,445	3,284	3,270		
% Successful Hunters	--	--	64%	72%	84%	85%	75%	81%		
Number Times Each Hunted	3.442	3,728	3.2	3.2	3.0	3.7	3.1	3.5		
Man Days of Hunting	691,735	719,489	6,538	3,690	7,008	13,416	13,546	17,106	1.96%	<b>2.38%</b>
Total Ducks Retrieved	681,728	809,159	9,048	8,266	15,438	16,099	24,486	24,365	3.59%	3.01%
Total Canada Geese Retrieved	38,996	68,395	2,498	1,502	3,583	3,506	6,081	5,008	15.59%	7.32%
Av. Number Ducks/Man/Day	0,986	1.125	1.38	2.24	<b>2.20</b>	1.20	1.81	<b>1.73</b>		
Av. Number Canada Geese/Man/Day	<b>0.056</b>	0.095	0.38	0.41	<b>0.51</b>	0.26	0.45	0.35		
Av. Number Ducks/Hunter/Season	3.39	4.19	4.43	7.17	6.61	5.60	5.59	6.05		
Av. Number Canada Geese/Hunter/Season	0.19	0.35	1.22	1.30	1.53	1.22	1.39	1.24		

## Discussion of Waterfowl Kill

If it were known exactly what proportion of the total hunting the club records represented, it would be possible to calculate annual waterfowl harvest from sport hunting since 1872. Unfortunately, we can only make very crude estimates of this proportion.

A map presented in 1927 showed 40 hunting clubs in the area. But there are now only about one-half that number. Several hunting clubs have closed or been sold in the past few years, and there is declining interest in active hunting clubs. Some of the major clubs that kept accurate records of waterfowl kill for 70 years are indifferent to maintenance of current records.

Arbitrarily assuming the club records represented 10 percent of the sport hunting kill of waterfowl for the past 90 years, the total kill for that time was estimated as 5 million ducks and 560,000 Canada geese by one-half million days of effort.

Many colorful tales of waterfowl hunting accompany these interesting club records, and frequently present day custodians of the records told us that on certain days club members might have sport of shooting only bull canvas-back, or some other favored species of one sex. The records, however, indicate this must have been an infrequent occurrence. The stories of kills of several hundred ducks per man-day were also retold more frequently than they occurred. Less frequently recounted were the days when no ducks were killed, but the records indicate some hunters had such days all the way back to 1872.

Formerly, "lay" days or days on which hunting was not permitted, were enforced; it is possible that the lay days contributed to greater hunter success.

It was suggested that baiting was more common in the past than at present, and contributed to increased success. However, food habit studies from the periods 1904-27 and 1958-62 indicated greater corn consumption by ducks in the latter period. A moderate amount of baiting, or dumping of grain in the bay to attract waterfowl, occurred in certain areas in Currituck Sound during the study.

We cannot reconcile the frequent reports of poor habitat conditions and low waterfowl populations since 1922 with the records of high kills of waterfowl in concurrent periods.

Declines in the duck kill per man-day occurred in 1884, 1908, 1918, 1926, 1936, 1946, and 1956 that suggested changes in habitat conditions. Similarly, peaks above the trend occurred in 1873, 1888, 1893, 1901, 1909, 1927, 1937, and 1955. These differences may have been related to weather conditions, changes in bag limits, or other factors.

Some of the more interesting characteristics of the trends in average kill of each species are the different years of the "turning point," or beginning of the downward trend. Of those species exhibiting such a turning point it occurred for redheads after 1883, baldpate after 1898, mallard and Canada geese after 1903, teal and total dabbler after 1913, black duck, **gadwall**, and shoveler after 1918, and **pintail**, **canvasback**, and total divers after 1923. The conjecture can be made that local decline in habitat conditions would result in greater similarity in the turning point for all species. Perhaps these turning points represent non-local changes in **habitat conditions, e.g., conditions** on the breeding grounds of these species.

#### Relationship of Waterfowl Kill to Bag Limits

The advent of daily bag limits of 25 ducks and 8 geese in 1918 (35 in the aggregate on Back Bay), did not seem to affect the average kill of ducks or geese. The club records for 1918 through 1929, when 25 ducks and 8 geese were permitted **daily, indicated** the average kill per man-ranged from 7.13 to 23.15 ducks and from 0.86 to 2.23 Canada geese per day. The corresponding percentages of the bag limit were 28.5 to 92.6 percent for ducks and 10.8 to 27.9 percent for Canada geese.

The second highest rate of kill was 23.15 ducks, or 92.6 percent of the bag limit in 1920; slightly below the all-time high of 25.20 ducks per man-day in 1901. There was no apparent effect from bag limits of 25 ducks per day. Apparently availability of ducks and satiation of hunter's desires were limiting factors on the kill.

Similarly, when the bag limit was 15 ducks per day from 1930 through 1932 the success per day was about the same as in 1926, 1928, and 1929. The kill per day of **58.8** to 62.3 percent, constituted a higher percentage of the bag limit. No strong suppression of the kill is exhibited by the bag limit of 15 ducks per day.

In 1933 and 1934, the bag limit for ducks was 12 per day. The success dropped slightly to 7.59 and 6.57, respectively. The percentage of the bag limit filled was not much different than in previous years.

From 1935 through 1945, when the bag limit was 10 ducks per day, the success ranged from 4.69 ducks per day in 1936 to a high of 8.32 ducks per day in 1942. This corresponds to 46.9 to 83.2 percent of the legal bag **limit**. Closed seasons and restrictions on some of the diving ducks for a few years after 1935 may have suppressed the average dailykill. We surmise that to sustain a kill of 83.2 percent of a bag limit of 10, the waterfowl population must surely have been at a high level; the midwinter inventory confirms that assumption, for over one million waterfowl were recorded in both 1942 and 1943.

In 1946, the bag limit was 7 ducks per day, and the kill per day of 3.61 ducks comprised 51.6 percent of the bag limit. This was the lowest kill to that time since the beginning of records in 1872.

From 1947 through 1958 the bag limit was four ducks per day. The percent of the bag limit filled ranged from a low of 69.5 percent or 2.78 ducks in 1957, to a high of 113.8 percent or 4.55 ducks in 1955. The low kill and use of the **area were reportedly** the worst ever to occur; it was attributed to poor growth of aquatic vegetation.. These were the culmination of events that resulted in this study. The kill of 113.8 percent of the legal bag in 1955 represents lack of restraint in relation to the bag limit, and demonstrates the zeal that accompanied the high duck populations of 99,275 ducks shown on the midwinter inventory of January 1955, and 94,050 ducks in January 1956. Duck populations in those 2 years were possibly the highest in the past 15 years.

From 1959 through 1961 the bag limit was three ducks per day. The average duck kill per day in each of these years in order was 2.04, 2.20, and 2.31; the corresponding percentage of the bag limit in each year was 68.0, 73.3, and 77.0. The increase in kill corresponds to the increased waterfowl use. This implies that the kill per day could still increase in relationship to the availability of ducks,. and therefore, the bag limits were not the only suppressing factor on the rate of kill. No doubt a bag limit of three, by eliminating the possibility of legally taking more birds when the opportunity presents itself, has restricted the average kill per day.

This seems to be further demonstrated in 1962 when 1.64 ducks per day comprised 82 percent of the bag limit of 2 ducks. Duck use in 1962 was over three million duck days, compared to one-sixth that amount in 1958.

Many intangible factors enter into the rate of kill of waterfowl, e.g., the number and availability of waterfowl, the total hunting pressure, the hunting methods used, closed seasons or restricted limits on certain species, the type of hunter, weather, and to certain degrees, bag limits, etc.

The record shows that in 1926 when the bag limit was 25 ducks per day only 7.13 ducks per day per hunter were killed; whereas, in 1955, 4.55 ducks were killed per man-day when the bag limit was 4 ducks per day.

As axiomatic as it may seem, with relatively low waterfowl populations, the legal rate of kill of ducks could not have been much better.

Despite the apparent relationship that exists when the bag limits and kill per day are scanned it should be borne in mind that, hopefully, bag limits have been established in relationship to populations.

From 1917 through 1929, when the bag limit was 8 Canada geese per day the average kill per man-day ranged from 0.86 to 2.23, or 10.8 to 27.8 percent of the bag limit.

During the period 1930 through 1939 the bag limit varied between 4 and 5 Canada geese per day, but the average kill per man-day remained relatively high, ranging from 0.76 to 1.64, or **19.0** to 41.0 percent of the bag limit.

**In** 1940 and 1941, when the Canada goose bag limit was 3 per day, the average kill per man-day was 0.90 and 0.87, respectively, or 30.0 and 29.0 percent of the bag limit.

During the period 1942 through 1962, the daily bag limit on Canada geese was **two, except** in 1947 and 1948 when only one per day was permitted in the bag. When the bag limit was 1 in those 2 years the kill rates were 0.18 and 0.57 per man-day. The range in kill of Canada geese per man-day when the bag limits were 2 was from a low of 0.18 in 1958 to a high of **0.76** in 1944, or 9.0 to 38.0 percent, respectively, of the bag limit.

No strong relationship appears to exist between the rate of kill **of** Canada geese and the bag limits of four or more per day.

When the bag limits on Canada geese were two or less per day it appears that the rate of kill was suppressed.

Table \_\_\_\_\_ Relationship of the Average Kill of Ducks and Geese on Back Bay and Currituck Sound from 10 Hunting Club Records to Bag Limits, 1918-1962.

Year	Ducks			Canada Geese		
	Bag Limit	Av. Kill Per Man-day	Percent	Bag Limit	Av. Kill Per Man-day	Percent
1918	25	14.74	59.0	8	1.27	15.9
1919	25	20.12	40.5	8	1.06	13.3
1920	25	23.15	92.6	8	1.85	23.1
1921	25	18.35	73.4	8	1.49	18.6
1922	25	14.77	59.1	8	0.86	10.8
1923	25	14.10	56.4	8	0.99	12.4
1924	25	14.21	<b>56.8</b>	8	1.81	22.6
1925	25	11.61	46.6	8	1.29	16.1
1926	25	7.13	28.5	8	1.23	15.4
1927	25	12.37	49.5	8	1.65	26.3
1928	25	9.46	37.8	8	2.23	27.9
1929	25	9.51	38.0	8	1.66	20.8
1930	15	9.20	61.3	4	0.86	21.5
1931	15	9.34	62.3	4	1.23	30.8
1932	15	8.82	58.8	4	1.64	41.0
1933	12	7.59	63.3	4	1.14	28.5
1934	12	6.57	54.8	4	0.95	23.8
1935	10	6.16	61.6	4	0.76	19.0
1936	10	4.69	46.9	4	1.12	28.0
1937	10	7.46	74.6	5	1.58	31.6
1938	10	6.90	69.0	5	1.08	21.6
1939	10	6.97	69.7	4	0.77	19.3
1940	10	5.08	50.8	3	0.90	30.0
1941	10	<b>6.43</b>	64.3	3	0.87	29.0
1942	10	8.32	83.2	2	0.51	25.5
1943	10	7.29	72.9	2	0.46	23.0
1944	10	6.79	67.9	2	0.76	38.0
1945	10	5.33	53.3	2	0.69	34.5
1946	7	3.61	51.6	2	0.37	18.5
1947	4	2.94	73.5	1	0.18	18.0
1948	4	3.79	96.8	1	0.57	57.0
1949	4	3.34	83.5	2	0.62	31.0
1950	4	3.26	81.5	2	0.64	32.0
1951	4	3.21	80.3	2	<b>0.38</b>	19.0
1952	4	3.04	76.0	3	0.74	24.7
1953	4	3.04	76.0	2	0.55	27.5
1954	4	3.54	88.5	2	0.29	14.5
1955	4	4.55	113.8	2	0.28	14.0
1956	4	2.81	70.3	2	0.25	12.5
1957	4	2.78	<b>69.5</b>	2	0.31	15.5
1958	4	3.00	75.0	2	0.18	9.0
1959	3	2.04	68.0	2	0.47	23.5
1960	3	2.20	73.3	2	0.32	16.0
1961	3	2.31	77.0	2	0.29	14.5
1962	2	1.64	82.0	2	0.63	31.5

Table \_\_\_\_\_ Waterfowl Bag Limits and Season Dates for Back Bay and Currituck Sound. 1%

Date	Ducks	Geese	Cnot	Season Dates/	Canada Goose Season
1916 <sup>2/</sup>	(35)			11/ 1- 2/ 1	(the same until 1959)
1917	(35)			11/ 1- 2/ 1	
1918	25(35) <sup>1/</sup>	8	25	11/ 1- 2/ 1	
1919	25	8	25	11/ 1- 1/31	
1920	25	8	25	11/ 1- 1/31	
1921	25	8	25	11/ 1- 1/31	
1922	25	8	25	11/ 1- 1/31	
1923	25	8	25	11/ 1- 1/31	
1924	25	8	25	11/ 1- 1/31	
1925	25	8	25	11/ 1- 1/31	
1926	25	8	25	11/ 1- 1/31	
1927	25	8	25	11/ 1- 1/31	
1928	25	8	25	11/ 1- 1/31	
1929	25	8	25	11/ 1- 1/31	
1930	15	4	25	11/ 1- 1/31	
1931	15	4	25	11/16-12/15	
1 9 3 2	15	4	25	11/16- 1/15	
1933	12	4	25	11/16- 1/15	
1934	12	4	25	11/ 8- 1/12	
1935 <sup>5/</sup>	10	4	15	11/20-12/19	
1936 <sup>5/</sup>	10	4	15	11/26-12/25	
1937 <sup>5/</sup>	10	5	15	11/27-12/26	
1938 <sup>5/</sup>	10	5	15	11/15-12/29	
1939 <sup>5/</sup>	10	4	25	11/15-12/29	
1940	10	3	25	11/ ^2-12/31	
1941	10	3	25	11/ 2-12/31	
1942	10	2	25	11/ 2- 1/10	
1943	10	2	25	11/ 2- 1/10	
1944	10	2	25	11/ 2- 1/20	
1945	10	2	25	11/ 2- 1/20	
1946	7	2	25	11/23- 1/ 6	
1947	4	1	25	12/ 8- 1/ 6	
1948	4	1	15	12/10- 1/ 8	
1949	4	2	15	11/29- 1/ 7	
1950	4	2	15	11/27- 1/ 5	
1951	4	2	10	11/22- 1/ 5	
1952	4	3	10	11/17- 1/10	
1953	4	2	10	11/11- 1/ 9	
1954	4	2	10	11/10- 1/10*	
1955	4	2	10	11/ 7- 1/15*	
1956	4	2	10	11/ 7- 1/15	
1957	4	2	10	11/ 7- 1/15	
1958	4	2	10	11/14- 1/15	

Table \_\_\_\_\_ (Cont'd) Waterfowl Bag Limits and Season Dates for Back Bay and Currituck Sound. 5/

Date	Ducks	Geese	coot	Season Dates <sup>3/</sup>	Canada Goose Season
1959	3	2	3	11/20- 1/ 8	(11/10-1/8 in NC only)
<u>1960<sup>5/</sup></u>	3	2	'6	11/19- 1/ 7	11/9-1/7
<u>1961<sup>5/</sup></u>	3	2	6	NC 11/21-12/30*	11/10-1/8
				Va 11/10-12/19	
<u>1962<sup>5/</sup></u>	2	2	6	11/10-12/29	11/10-1/8
<u>1963<sup>5/</sup></u>	3	2	8	11/16- 1/ 4	11/7-1/15
1964	3	3	10	11/14- 1/ 2	

- 1/ From 1918 through 1926 on Back Bay 35 ducks, geese, and brant permitted in the aggregate.
- 2/ From 1916-1929 on Back Bay no hunting was permitted on **Wednesdays**, Saturdays, or Sundays, and this applied to Currituck Sound **about** the same period.
- 3/ Seasons in those years denoted with an asterisk varied slightly between Back Bay and Currituck Sound and outside dates are shown here.
- 4/ At least through 1930 season limits were specified, e.g. in 1930 limits were 350 ducks, 250 coot, and 50 geese per season. Possession limits thereafter have with few exceptions been double the daily bag limits.
- 5/ The numerous exceptions through the years on swan, snow geese, wood duck, canvasback, redhead, ruddy duck, bufflehead, etc., should be checked for specific regulations in any year.

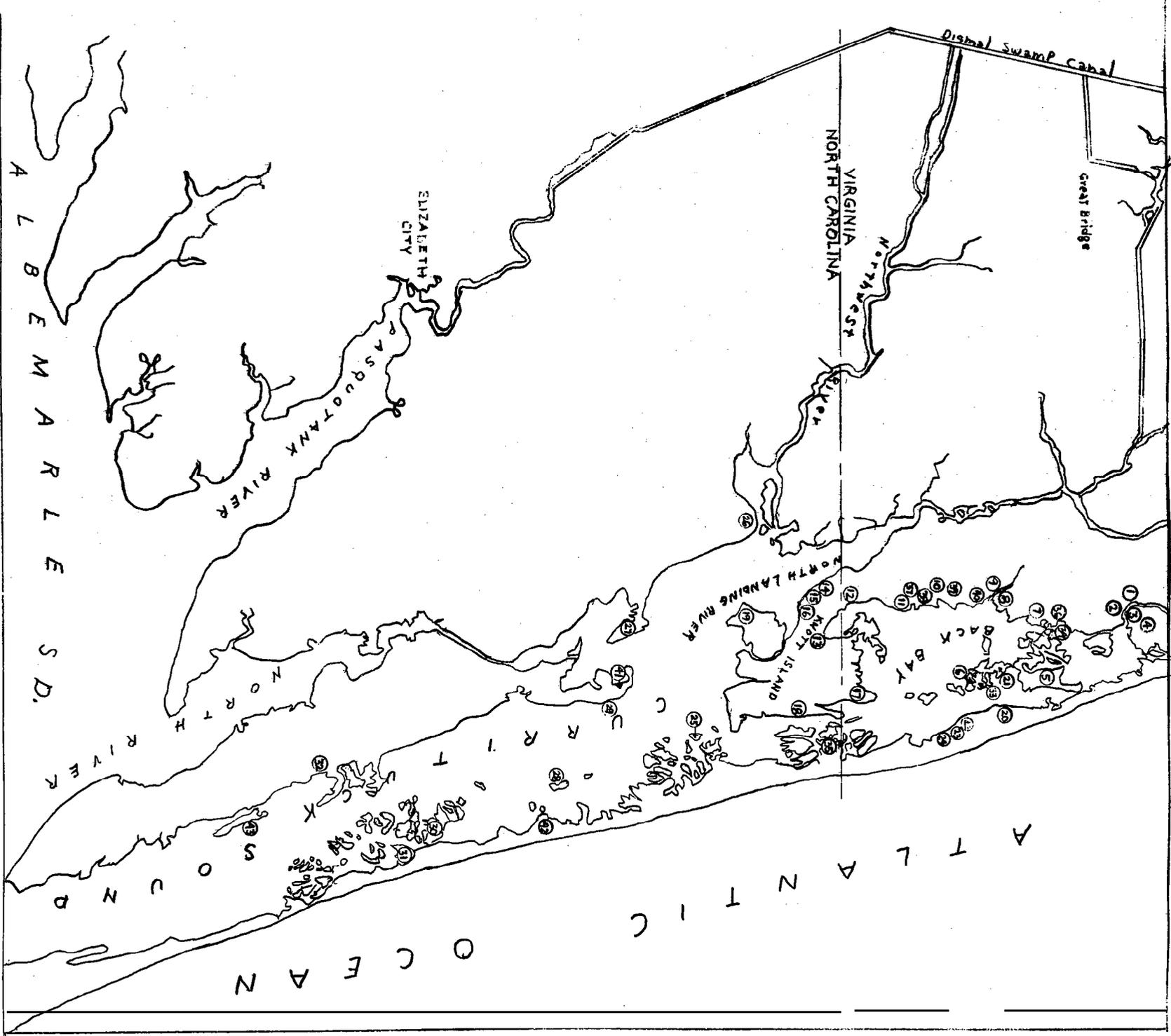


Figure \_\_\_\_\_ . Approximate Location of Hunting Clubs and Lodges in 1927. Copied from U.S. Army Corps of Engineers Map (File No. 2-16-7630) (1927).

Table \_\_\_\_\_ Approximate Location of Hunting Clubs and Lodges in 1927.

1. Westchester Gunning Association
2. Powhatan Fowling Club
3. Langhorne-Putney
4. Piney Point Gunning Club
5. Princess Anne Club
6. Ragged Island Gunning Club
7. Chanty Neck Club, Inc.
8. Drum Point Gunning Club
9. Henry and Rufus Keirn
10. Ogden Reid and G. V, Rogers
11. Pellitory Gunning Club, Inc.
12. Pocahontas Fowling Club
13. W. E. Corey
14. Dixon
15. Reid
16. Morse Point Gunning Club
17. Knott Island Gunning Club, Inc.
18. Currituck Sound Shooting Club
19. Knapp
20. 'Newport News Ducking Club
21. **Barbour**
22. Virginia-Maryland Gunning Club
23. False Cape Gunning Club
24. False Cape Battery and Blind Ducking Club, Inc.
25. Swan Island Club
26. Launch Shooting Club
27. Bell Island Club
28. Monkey Island Club
29. White
30. Currituck Club
31. Pine Island Club.
32. Narrows Island Club
33. Ball Island Gunning Club
34. Back Bay Gunning Club
35. Horse Island Gunning Club
36. White Marsh Fowling Club
37. Neff and Thompson Gunning Club
38. Horton
39. Richmond Gunning Club
40. **Tully** Williams
41. Hampton Lodge
42. **Whale** Head Club
43. Dews Quarter Island Club

Table . Annual Kill of Dabbling Ducks, Diving Ducks, **Total Ducks**, Canada Geese, and Total Waterfowl Per Man Day of Hunting from 1872 to 1962 from Hunting Club Records on Back Bay, Virginia, and Currituck Sound, North Carolina.

Year	Dabblers	Divers	Total Ducks <sup>1/</sup>	Canada Geese	Total Waterfowl <sup>2/</sup>	Man Days <sup>3/</sup>	Total WATERFOWL KILLED
1872			12.68	0.81	13.49	x 47 (47)	634
1873			19.94	1.27	21.21	67 (67)	1421
1874	3.33	1.79	8.03	0.49	8.53	57 (110)	486
1875	4.30	2.88	11.05	0.79	11.88	80 (169)	950
1876	2.02 2.8	3.38 2.7	9.11	0.49	9.70	156 (253)	1513
1877	1.49	2.83	8.04	0.53	8.61	121 (223)	1042
1878	1.45	1.44	7.56	0.54	8.14	206 (340)	1677
1879	1.71 2.7	1.28 1.5	9.90	0.64	10.57	111 (205)	1173
1880	2.80	2.02	so.94	0.57	11.53	165 (245)	1902
1881	4.65	1.19	11.35	0.75	12.17	133 (183)	1619
1882	2.83	1.68	11.49	0.65	12.20	206 (267)	2513
1883	2.29 3.2	1.21 1.5	11.40	0.64	12.08	115 (210)	1389
1884	1.12	1.21	8.39	0.49	8.90	117 (283)	1041
1885	7.04	2.08	12.98	1.29	14.34	327 (423)	4689
1886	1.17	3.13	11.76	0.76	12.56	119 (190)	
1887	3.55 5.3	6.37 3.0	15.00	0.74	15.76	214 (292)	1495 3373
1888	9.59	1.31	17.40	1.26	18.67	222 (301)	4145
1889	6.96	0.99	12.14	1.11	13.38	211 (300)	2823
1890	6.77	0.81	11.28	0.78	12.09	268 (381)	3240
1891	9.35	0.79	13.00	0.73	13.76	176 (292)	2422
1892	14.18 12.4	1.47 1.3	14.84	0.80	15.72	152 (225)	2389
1893	19.40	2.03	22.10	1.05	23.21	151 (252)	3505
1894	8.59	1.61	12.10	1.58	13.75	333 (391)	4579
1895	11.26	0.45	13.81	2.77	16.66	225 (290)	3749
1896	9.98 10.4	0.79 1.1	11.21	2.21	13.49	233 (324)	3143
1897	11.71	1.39	14.66	2.67	17.37	215 (315)	3735
1898	13.99		17.10	2.21	19.34	213 (367)	4119
1899	12.45	1.54	15.28	2.03	17.36	298 (481)	5173
1900	18.23 16.3	0.63 1.4	16.88	2.24	19.14	288 (512)	5512
1901	20.59	0 7 6	25.20	2.29	27.53	299 (485)	10186
1902	15.22	-5x6--	16.72	1.72	18.52		
1903	19.89	1.84	21.46	1.50	23.02	257 (456)	5916
1904	16.30 16.0	2.92 1.6	21.85	2.28	24.15	504 (662)	12172
1905	12.53	1.01	17.30	1.98	19.40	483 (649)	9370

Table

(Cont'd) Annual Kill of Dabbling Ducks, Diving Ducks;- Total Ducks, Canada Geese  
and Total Waterfowl Per Man Day of Hunting from 1872 to 1962 from Hunting Club Records on  
Back Bay, Virginia, and Currituck Sound, North Carolina...

Year	Dabblers	Divers	Total Ducks <sup>1/</sup>	Canada Geese	Total Waterfowl <sup>2/</sup>	Man Days <sup>3/</sup>
1906	11.39	1.25	15.48	1.00	16.56	361 (539) <del>5978</del>
1907	15.05	0.77	16.21	1.50	17.81	450 (622) - 8015
1908	11.66	1.62	14.78	1.56	16.53	490 <del>(550)</del> 12955
1909	18.60	1.51	20.30	2.99	23.47	
1910	13.62	1.46	15.30	1.40	16.89	577 <del>---</del> 9746
1911	19.53	1.23	20.94	2.57	23.79	538 <del>---</del> 12799
1912	16.14	0.95	17.68	2.04	20.00	596 <del>---</del> 11920
1914	17.95	1.36	19.49	2 . 5 2	22.02	585 <del>---</del> 12882
	15.51	1.35	17.02	2.36	19.38	521 <del>---</del> 10097
1915	14.85	11.38	15.85	1.94	17.79	484 <del>---</del> 14307
			19.76	1.64	21.81	
1917	15.84	5.55	21 . 6 7	2.50	24.20	322 <del>---</del> 7792
1918	13.22	1.07	14.74	1.27	16.01	415 <del>---</del> 6644
1919	13.02	2.02	20 . 1 2	1.06	21.17	418 <del>---</del> 8849
1920	15.45	3.09	23.15	1.85	25.00	492 <del>---</del> 12300
1921	15.24	2.56	18.35	1.49	19.84	566 <del>---</del> 11229
1922	12.53	1.88	14.77	0.86	15.63	816 <del>---</del> 12754
1923	12.33	1.37	14.10	0.99	15.09	793 <del>---</del> 11966
1924	13.32	0.80	14.21	1.81	16.03	814 <del>---</del> 13048
1925	10.79	0.65	11.61	1 . 2 9	12.91	671 <del>---</del> 8663
	6.13	0.85	7 . 1 3	1.23	8.39	685 <del>---</del> 5747
1927	7.59	1.62	12.37	1.65	-14.11	649 <del>---</del> 9157
1928	8.16	1.02	9.46	2.23	11.69	772 <del>---</del> 9025
1929	8.17	1.09	9.51	1.66	11.17	636 <del>---</del> 7104
1930	7.44	0.80	9.20	0.86	10.67	555 <del>---</del> 5922
1931	8.43	0.40	9.34	1.23	10.57	361 <del>---</del> 3816
1932	8.18	0.34	8.82	1.64	10.46	433 <del>---</del> 4529
1933	6.77	0.64	7.59	1.14	8 . 7 3	385 <del>---</del> 3361
1934	5.96	0.44	6.57	0.95	7.52	371 <del>---</del> 2790
1935	5.40	0.69	6.16	0.76	6.92	277 <del>---</del> 1917
1936	4.26	0.34	4.69	1.12	5.81	419 <del>---</del> 2434
1937	6.92	0.36	7 . 46	1.58	9.04	399 <del>---</del> 3607
		0.76	6.90	1.08	8.54	621 <del>---</del> 5303
1939	9.63	1.04	6.97	0.77	7.77	786 <del>---</del> 6107
1940	4.20	0.81	5.08	0.90	6.00	-892 <del>---</del> 5352

Table . (Cont'd) Annual Kill of Dabbling Ducks, Diving Ducks, Total Ducks, Canada Geese, and Total Waterfowl Per Man Day of Hunting from 1872 to 1962 from Hunting Club Records on Back Bay, Virginia, and Currituck Sound, North Carolina?

Year	Dabblers	Divers	Total Ducks <sup>1/</sup>	Canada Geese	Total Waterfowl <sup>2/</sup>	Man Days <sup>3/</sup>
1941	5.40	0.93	6.43	0.87	7.46	865 <del>6453</del> ✓
1942	5.14	1.97	8.32	0.51	8.85	594 <del>5257</del> ✓
1943	5.49	1.20	7.29	0.46	7.58	938 592 <del>467102</del> ✓
1944						
1945	3.73	1.35	5.33	0.69	6.16	1,053 <del>1,401</del> ✓
1946	2.73	0.60	3.61	0.37	3.98	595 <del>2368</del> ✓
1947	1.82	1.03	2.94	0.18	3.22	446 <del>113</del> ✓
1948	2.42	0.90	3.79	0.57	5.02	740 <del>1436</del> ✓
1949	2.31	0.52	3.34	0.62	4.51	939 <del>3715</del> ✓
	2.15	0.81	3.26	0.64	4.31	949 <del>4235</del> ✓
	2.15	0.85	3.21	0.74	4.29	865 <del>4090</del> ✓
	1.89	0.58	3.04	0.38	3.83	1,072 <del>3313</del> ✓
	2.42	0.33	3.04	0.55	4.03	
1954	2.82	0.47	3.54	0.29	3.91	1,138 <del>4784</del> ✓
1955	3.57	0.95	2.81	0.28	3.20	1,214 <del>4450</del> ✓
1956	1.95	0.75	2.78	0.25	3.14	1,892 <del>4438</del> ✓
1957	2.22	0.50	2.78	0.31	3.14	1,086 <del>3440</del> ✓
1958	2.30	0.66	3.00	0.18	3.29	1,185 <del>3899</del> ✓
1959						
1960	1.82	0.48	2.01	0.29	2.64	1,402 <del>3983</del> ✓
1961	1.85	0.32	2.01	0.47	2.64	1,402 <del>3015</del> ✓
1962	1.39	0.75	1.64	0.63	2.47	1,101 <del>2719</del> ✓
Total:						47,538 (51,668 <sup>3/</sup> )

1/ Includes mergansers and unidentified ducks.  
 2/ Includes coots, swan, and snow geese.  
 3/ Man-days for total ducks, canada geese, and total waterfowl-in- parenthesis.

Table. . Average Kill of Waterfowl by Species, Per Man Day of Effort, in Five Year Intervals<sup>1/</sup> from 1872 - 1962; as Determined from Hunt Club Records of Back Bay, Virginia, and Currituck Sound, North Carolina.

Season	Mallard	Black	Gadwall	Bald ate	Pintail	Teal <sup>2/</sup>	Shoveler	Total Dabbler	Man Days
1-1872-1873	*	*	*	*	*	*	*	*	114
<b>1874-1878</b>	0.18	0.47	0.19	0.77	0.29	0.19	0.06	2.15	620
1879-1883	0.26	0.38	0.05	1.45	0.68	0.16	0.05	3.03	730
1884-1888	0.87	1.30	0.57	2.04	0.52	0.17	0.01	5.48	999
1889-1893	2.02	3.47	0.47	2.70	1.48	0.32	0.00	10.46	958
1894-1898	2.01	4.12	0.30	3.61	1.15	0.44	0.03	11.66	1,219
1899-1903	3.98	6.65	0.70	3.44	1.62	0.87	0.10	17.36	1,512
1904-1908	3.40	4.96	0.64	2.06	1.75	0.55	0.14	13.50	2,294
1909-1913	1.67	6.39	0.70	2.72	<b>3.90</b>	0.91	0.18	16.47	2,848
1914-1918	2.24	6.13	0.94	2.30	3.02	0.71	0.28	15.62	2,398
1919-1923	1.38	4.73	0.82	2.15	4.04	0.33	0.05	13.50	3,085
1924-1928	0.96	2.76	0.63	1.66	2.83	0.40	0.04	9.28	3,591
1929-1933	0.56	2.10	0.24	1.60	2.88	0.39	0.03	7.80	2,370
1934-1938	0.23	1.37	0.11	0.99	2.20	0.33	0.06	5.29	2,087
1939-1943	0.17	1.05	0.13	1.28	2.80	<b>0.42</b>	0.05	5.90	3,729
1944-1948	0.12	0.63	0.19	0.98	0.96	0.28	0.05	3.21	3,772
1949-1953	0.16	0.34	0.20	0.65	0.57	0.21	0.02	2.15	5,039
1954-1958	0.25	0.24	0.21	1.13	0.44	0.18	0.02	2.47	5,534
1959-1962	0.20	0.35	0.09	0.52	0.35	0.16	0.01	1.68	4,639

<sup>1/</sup> 1872-1873: a two year average; 1959-1962: a four year average.

<sup>2/</sup> Predominately green-wing teal.

\* No data available.

Table . (Cont'd) Average Kill of Waterfowl by Species, Per Man Day of Effort, in Five Year Intervals<sup>1/</sup> from 1872 - 1962; as Determined from Hunt Club Records from Back Bay, Virginia, and Currituck Sound, North Carolina.

Season	Redhead	Canvasback	Blackhead	Total Diver	Merganser <sup>2/</sup>	Unid. Ducks	Total Ducks	Coot	Canada Geese	Snow Geese	Swan	Total Waterfowl	Man Days
1872-1873	*	*	*	*	*	16.95	16.95	*	0.06	*	*	17.01	114
1874-1878	0.39	1.22	0.44	2.05	0.00	0.56	4.76	0.00	0.99	0.00	0.09	5.84	620
1879-1883	0.53	0.31	0.33	1.17	0.00	0.37	4.57	0.00	0.98	0.00	0.07	5.62	730
1884-1888	0.35	0.24	0.81	1.40	0.00	1.46	8.34	0.00	1.43	0.00	0.05	9.82	999
1889-1893	0.13	0.07	0.44	0.64	0.00	0.49	11.59	0.00	1.34	0.00	0.09	13.02	958
1894-1898	0.20	0.14	0.13	0.47	0.00	0.92	13.05	0.00	3.11	0.00	0.09	16.25	1,219
1899-1903	0.12	0.26	0.20	0.58	0.00	0.49	18.43	0.00	3.27	0.00	0.08	21.78	1,512
1904-1908	0.31	0.68	0.31	1.30	0.01	0.60	15.41	0.04	2.31	0.01	0.10	17.87	2,294
1909-1913	0.19	0.44	0.48	1.11	0.14	0.31	18.03	0.00	2.29	0.01	0.18	20.51	2,848
1914-1918	0.19	1.06	0.32	1.57	0.16	0.35	17.70	0.00	1.91	0.00	0.11	19.72	2,398
1919-1923	0.23	1.01	0.37	1.61	0.00	0.45	15.56	0.00	1.19	0.00	0.00	16.75	3,085
1924-1928	0.12	0.59	0.14	0.85	0.00	0.26	10.39	0.02	1.66	0.01	0.00	12.08	3,591
1929-1933	0.18	0.30	0.18	0.66	0.00	0.50	8.96	0.00	1.32	0.00	0.00	10.28	2,370
1934-1938	0.05	0.04	0.25	0.34	0.00	0.31	5.94	0.17	1.12	0.00	0.00	7.23	2,087
1939-1943	0.23	0.29	0.66	1.18	0.00	0.16	7.24	0.06	0.74	0.00	0.00	8.04	3,729
1944-1948	0.27	0.31	0.40	0.98	0.00	0.26	4.45	0.19	0.57	0.00	0.00	5.21	3,772
1949-1953	0.08	0.28	0.20	0.56	0.00	0.39	3.10	0.44	0.59	0.00	0.00	4.13	5,039
1954-1958	0.09	0.24	0.27	0.60	0.00	0.12	3.19	0.10	0.26	0.00	0.00	3.55	5,534
1959-1962	0.00	0.00	0.33	0.33	0.00	0.02	2.03	0.10	0.42	0.00	0.00	2.55	4,639

<sup>1/</sup> 1872-1873: a two year average; 1959-1962: a four year average.

<sup>2/</sup> Includes Redbreasted, Hooded, and American' Mergansers.

\* No data available.

Table . The Average Kill of Waterfowl by Species, Per Man Day of Effort, in Five Year Intervals<sup>1/</sup> from 1872 - 1962 Expressed as a Percent of the Total Kill; as Determined from Hunt Club Records of Back Bay, Virginia, and Currituck Sound, North Carolina.

Season	% Mallard	% Black	% Gadwall	% Baldpate	% Pintail	% Teal <sup>2/</sup>	% Shoveler	Total Dabbler	Total Waterfowl Per Man Day
1872-73	*	*	*	*	*	*	*	*	17.01
1874-78	3	8	3	14	5	3	1	37	5.84
1879-83	4	7	1	26	12	3	1	54	5.62
<b>1884-88</b>	9	13	6	21	5	2	0	56	9.82
1889-93	15	27	4	21	11	2	0	80	13.02
1894-98	12	25	2	22	7	3	0	71	16.25
<b>1899-1903</b>	18	31	3	<b>16</b>	8	4	0	80	21.78
1904-08	19	28	3	11	10	3	1	75	17.87
1909-13	8	31	4	13	19	4	1	80	20.51
1914-18	11	31	5	12	15	4	1	79	19.72
1919-23	8	29	5	13	24	2	0	81	16.75
<b>1924-28</b>	8	23	5	14	23	3	1	77	<b>12.08</b>
1929-33	5	20	2	16	28	4	0	75	10.28
1934-38	<b>3</b>	19	2	14	30	4	1	73	7.23
1939-43	2	13	2	16	35	5	0	73	8.04
1944-48	2	12	-4	19	18	5	1	61	5.21
1949-53	4	8	5	16	14	5	-0	52	4.13
1954-58	7	7	6	32	12	5	1	70	3.55
1959-62	8	14	4	20	14	6	0	66	2.55
Average 1872-1943	9	22	3	16	17	3	1	71	
Average 1944-1962	5	10	5	22	15	5	1	62	
Average 1872-1962	<b>8</b>	19	4	18	16	4	1	69	

<sup>1/</sup> 1872-1873: a two year average; 1959-1962: a four year average.

<sup>2/</sup> Predominately green-wing teal.

\* No data available.

Table (Cont'd) The Average Kill of Waterfowl by Species, Per Man Day of Effort, in Five Year Intervals<sup>1/</sup> from 1872 - 1962 Expressed as a Percent of the Total Kill; as Determined from Hunt Club Records of Back Bay, Virginia, and Currituck Sound, North Carolina.

Season	% Redhead	% Canvasback	% Blackhead	% Total Diver	% Merganser <sup>2/</sup>	% Unid. Ducks	% Total Ducks	% Coot	% Canada 'Geese	% Snow Geese	% Swan	Total. Waterfowl Per Man Day
<del>1872-73</del> 1874-78 <sup>3</sup>	* 7	2*	*	3*	*	100	100	*	0	*	*	17.01
1879-83	9	6	6	21	0	6	81	0	17	0	1	5.84
1884-88	4	2	8	14	0	15	85	0	18	0	1	5.62
1889-93	1	1	3	5	0	4	89	0	14	0	1	9.82
1894-98	1	1	1	3	0	6	80	0	10	0	1	13.02
1899-1903	1	1	1	3	0	2	85	0	19	0	1	16.25
1904-08	2	4	2	8	0	3	86	0	15	0	1	21.78
1909-13	1	2	2	5	1	2	88	0	13	0	1	17.87
1914-18	1	5	2	8	1	2	90	0	11	0	1	20.51
1919-23	1	6	2	9	0	3	93	0	10	0	0	19.72
1924-28	1	5	1	7	0	2	93	0	7	0	0	16.75
1929-33	2	3	2	7	0	5	86	0	14	0	0	12.08
1934-38	1	1	3	5	0	4	87	0	13	0	0	10.28
1939-43	3	4	8	15	0	2	82	2	16	0	0	7.23
1944-48	5	6	8	19	0	5	90	1	9	0	0	8.04
1949-53	2	7	5	14	0	9	85	4	11	0	0	5.2-1
1954-58	0	0	10	13	0	3	75	11	14	0	0	4.13
						1	90	3	7	0	0	3.55
						1	80	4	16	0	0	2.55
Average 1872-1943	3	4	3	10	0	7	86	0	13	0	1	
Average 1944-1962	2	5	8	16	0	5	83	6	12	0	0	
Average 1872-1962	2	5	4	12	0	7	86	1	13	0	0	

<sup>1/</sup> 1872-1873: a two year interval; 1959-1962: a four year interval.

<sup>2/</sup> Includes Hooded, American, and Redbreasted Mergansers.

\* No data available.

Figure \_\_\_\_\_. Man-days of Hunting and Average Waterfowl Kill Per Man-day by 5 Year Periods 1872-1962 from Ten Hunting Club Records on Back Bay, Virginia, and Currituck Sound, North Carolina.

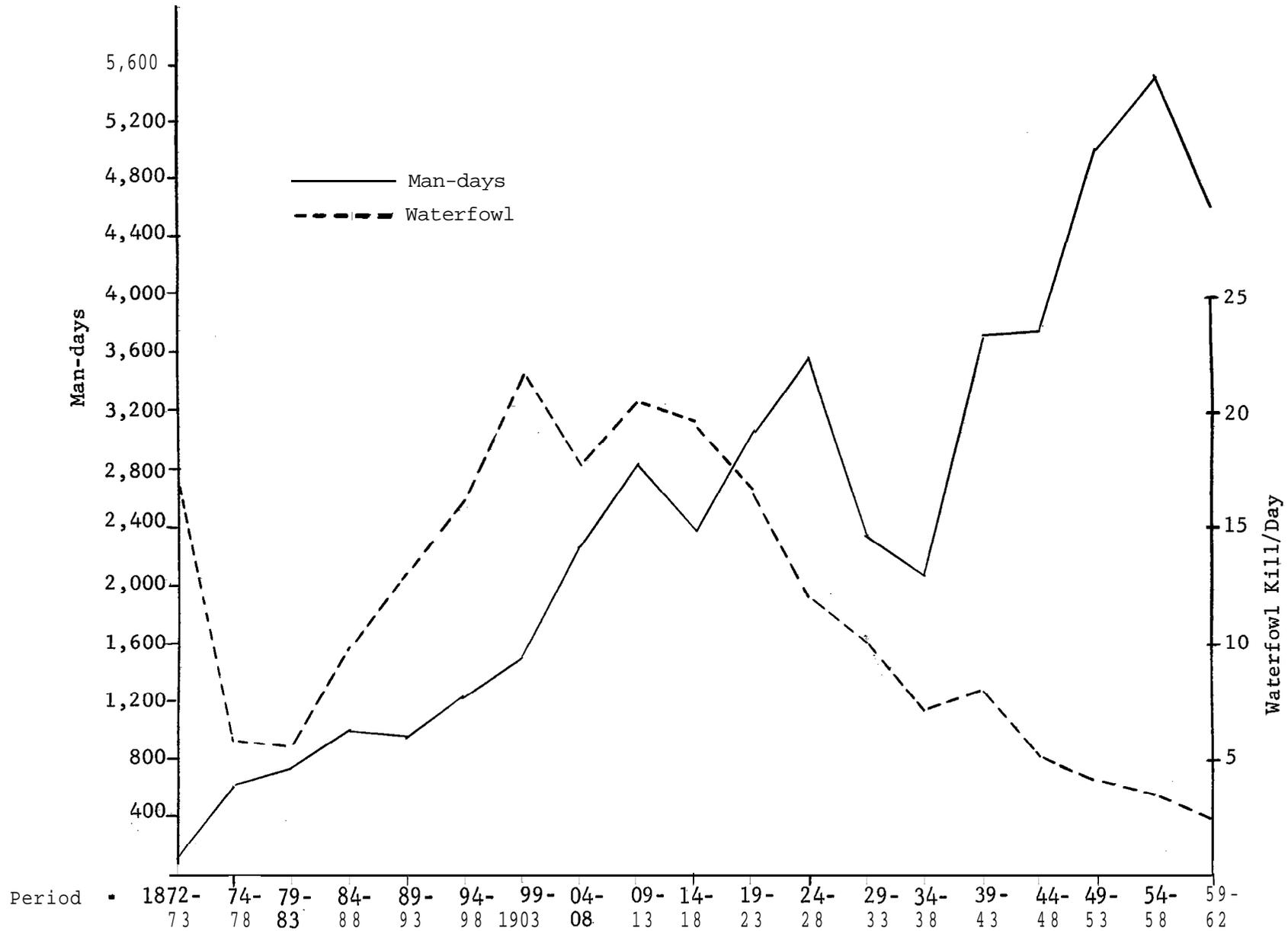


Figure \_\_\_\_\_, Annual Dabbling Duck Kill Per Man-day of Hunting from Ten Hunting Club Records on Back Bay, Virginia, and Currituck Sound, North Carolina, 1874-1962.

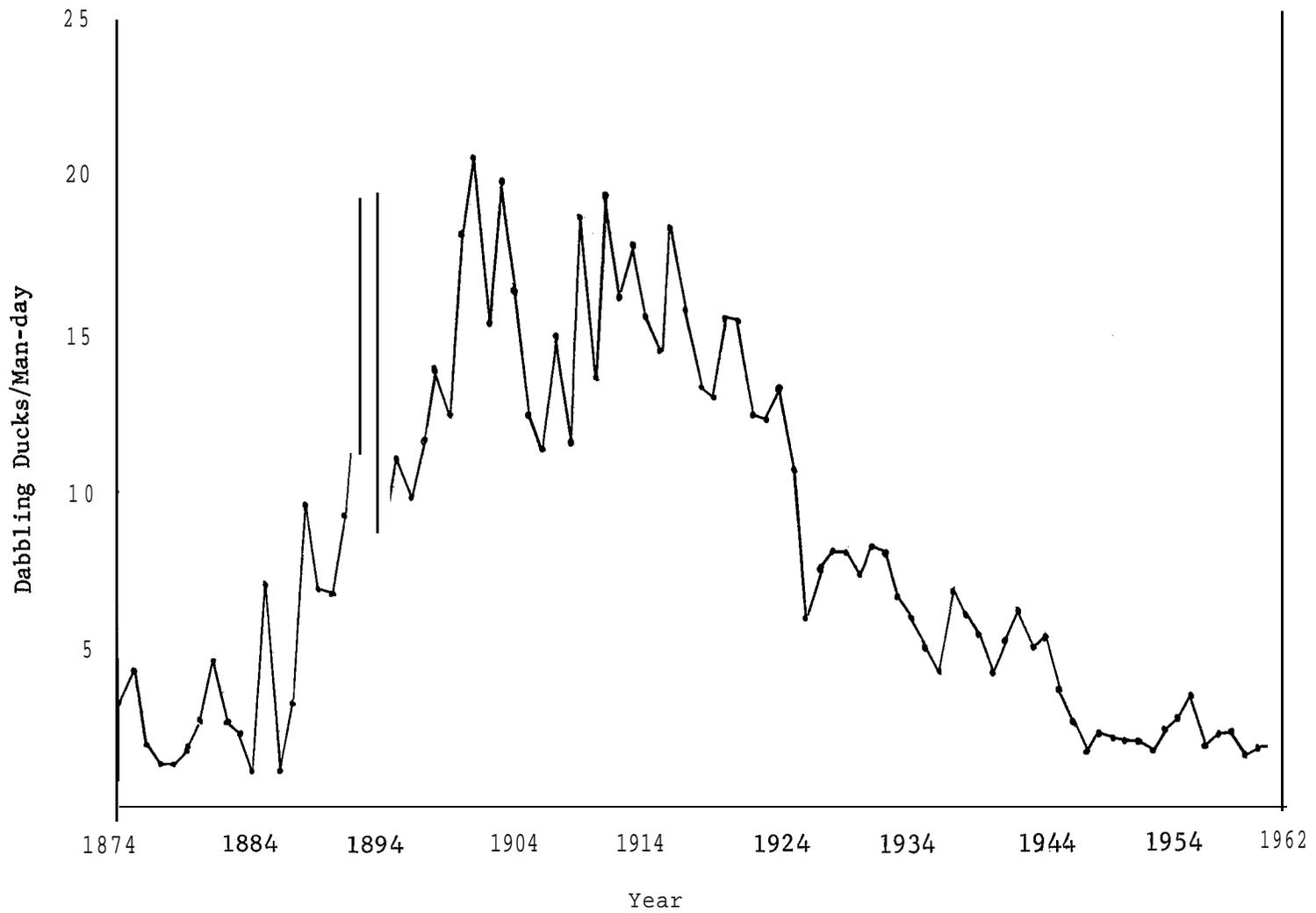


Figure \_\_\_\_\_ Annual Diving Duck Kill Per Man-day of Hunting from Ten Hunting Club Records on Back Bay, Virginia, and Currituck Sound, North Carolina, 1874-1962.

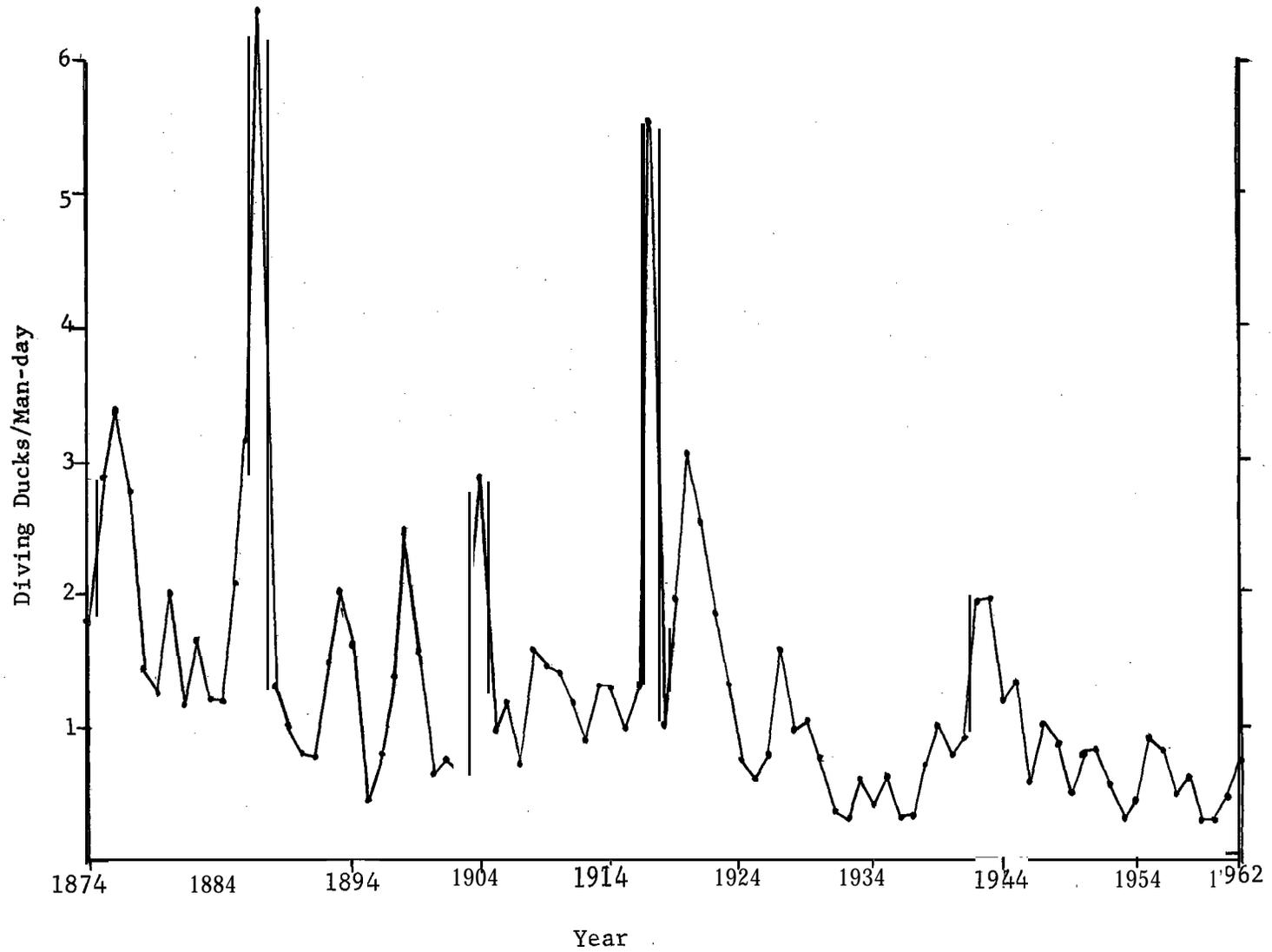


Figure \_\_\_\_\_. Average Number of Each Waterfowl Group Per Man-day of Hunting by 5 Year Periods from 1874-1962 from Ten Hunting Cub Records on Back Bay, Virginia, and Currituck Sound, North Carolina.

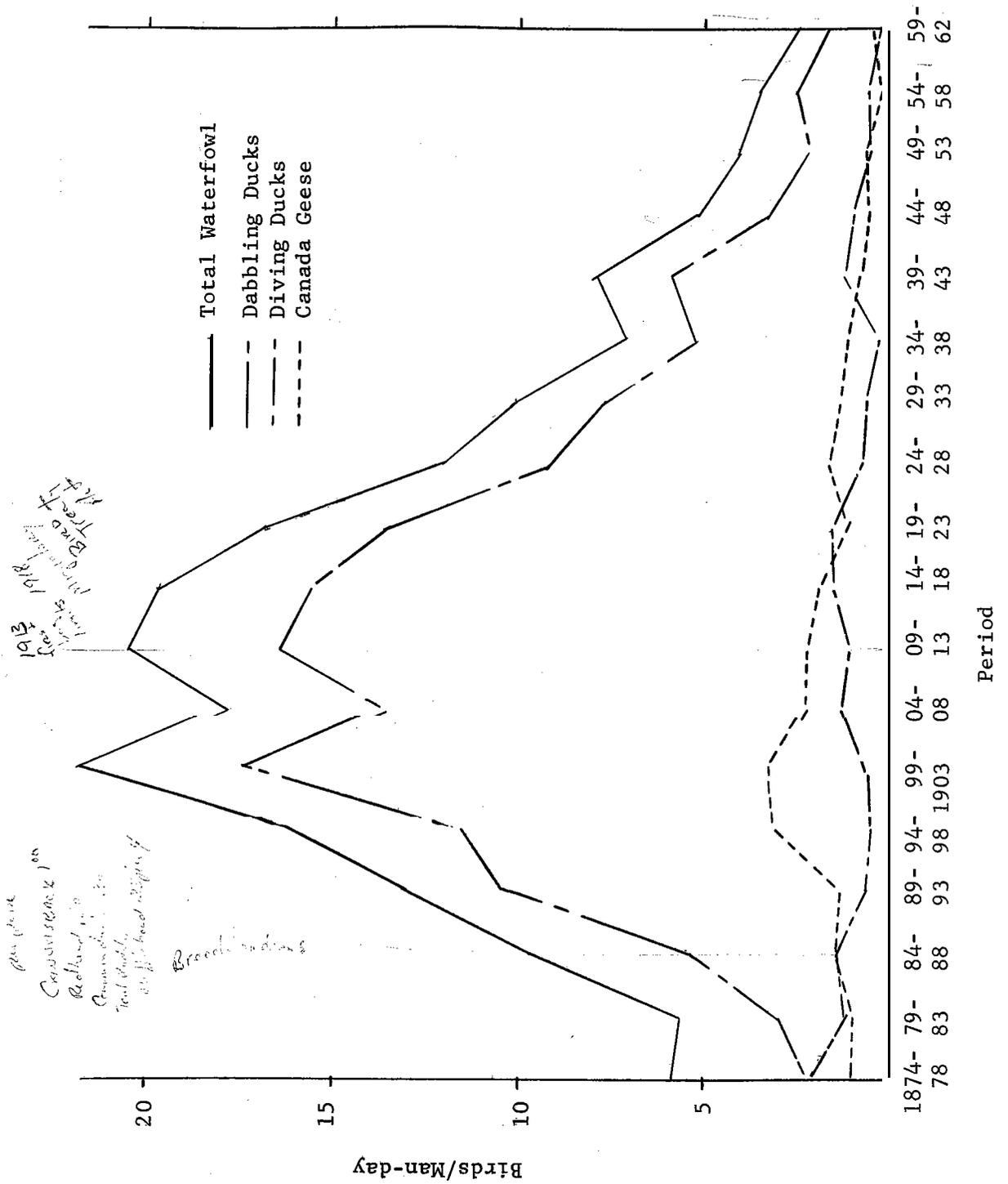


Figure \_\_\_\_\_. Average Number of Black Duck, Mallard, and Pintail Per Man-day of Hunting from Ten Club Records of Back Bay, Virginia, and Currituck, North Carolina, by 5 Year Periods 1874-1962.

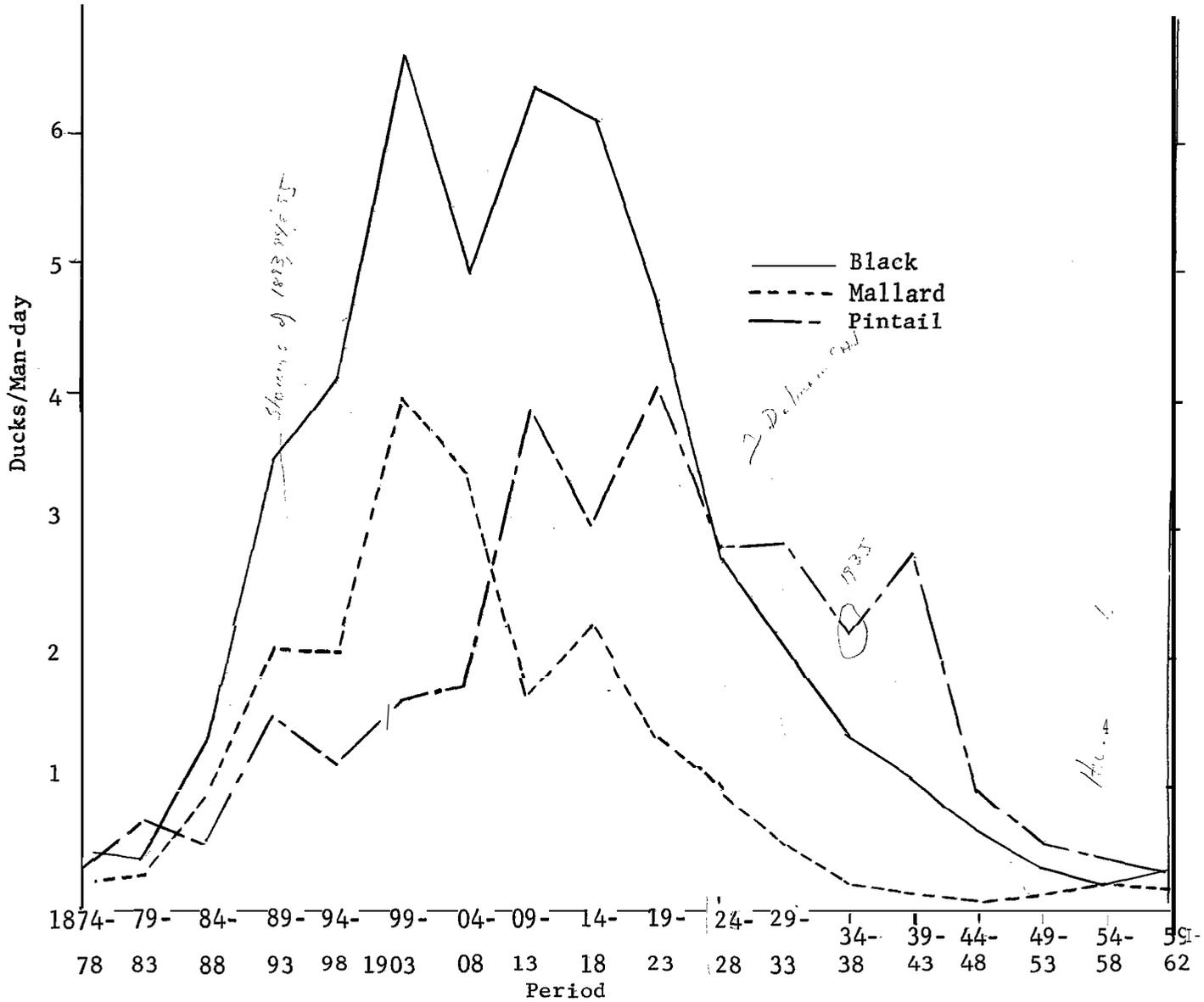


Figure \_\_\_\_\_ Average Number of Baldpate, **Gadwall**, and Teal Per Man-day of Hunting from Ten Club Records of Back Bay, Virginia, and Currituck Sound, North Carolina, by 5 Year Periods 1874-1962.

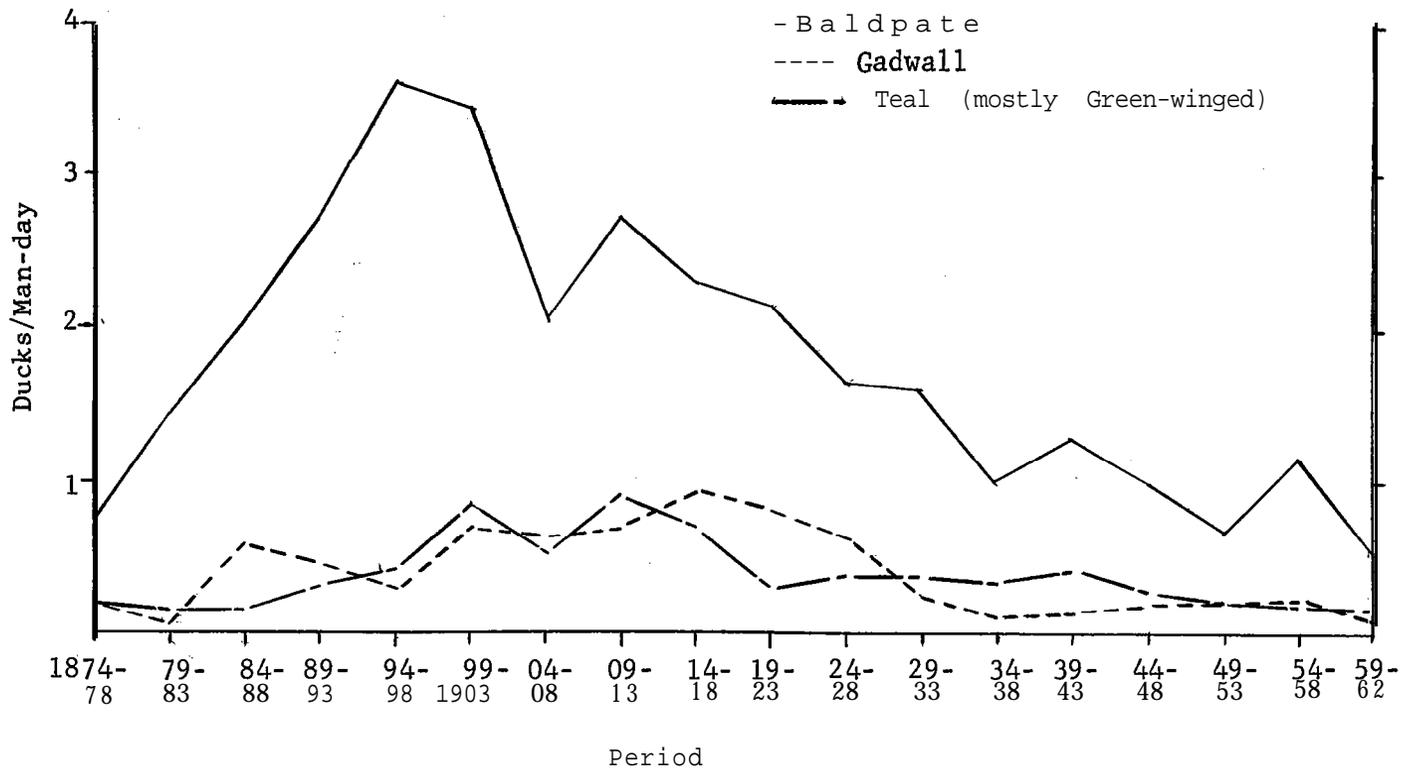


Figure \_\_\_\_\_ Average Number of Canvasback, Redhead, and Blackhead Per Man-day of Hunting from Ten Club Records of Back Bay, Virginia, and Currituck Sound, North Carolina, by 5 Year Periods, 1874-1962.

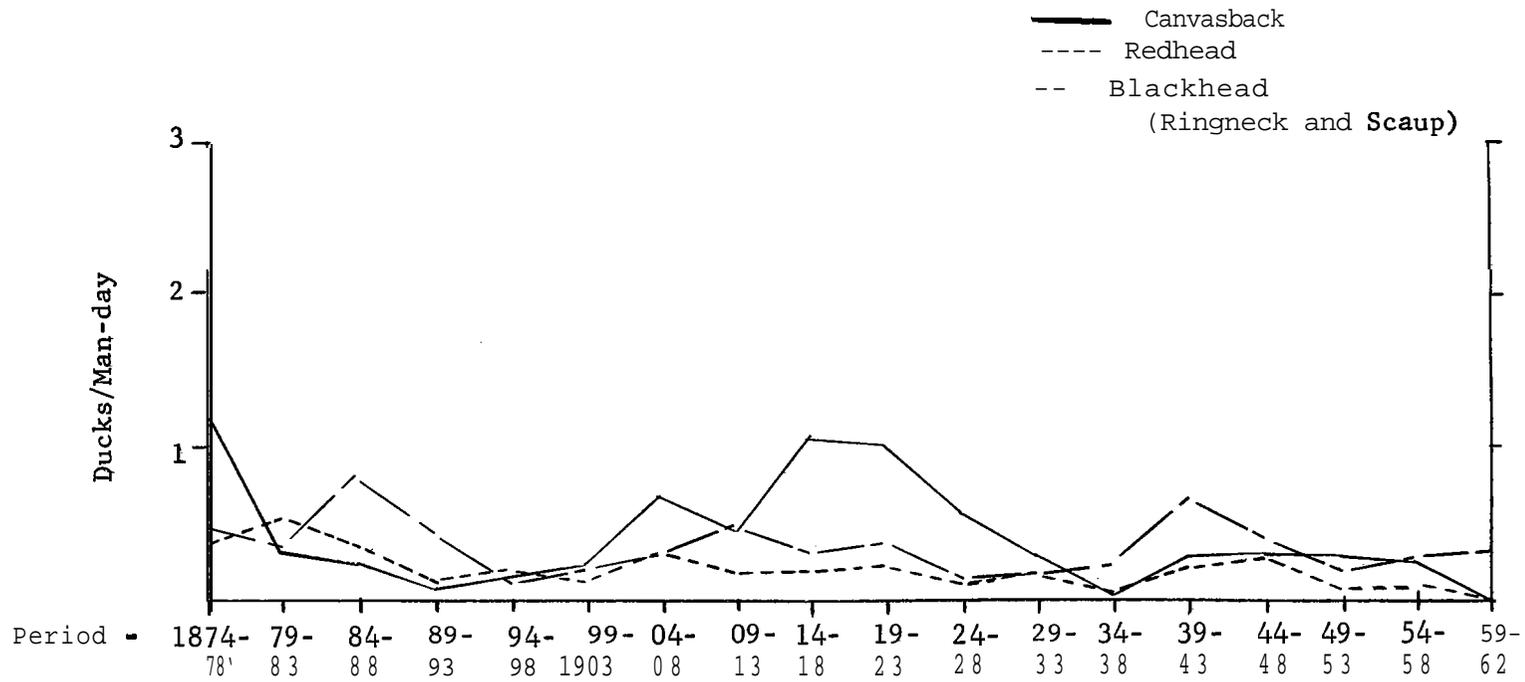
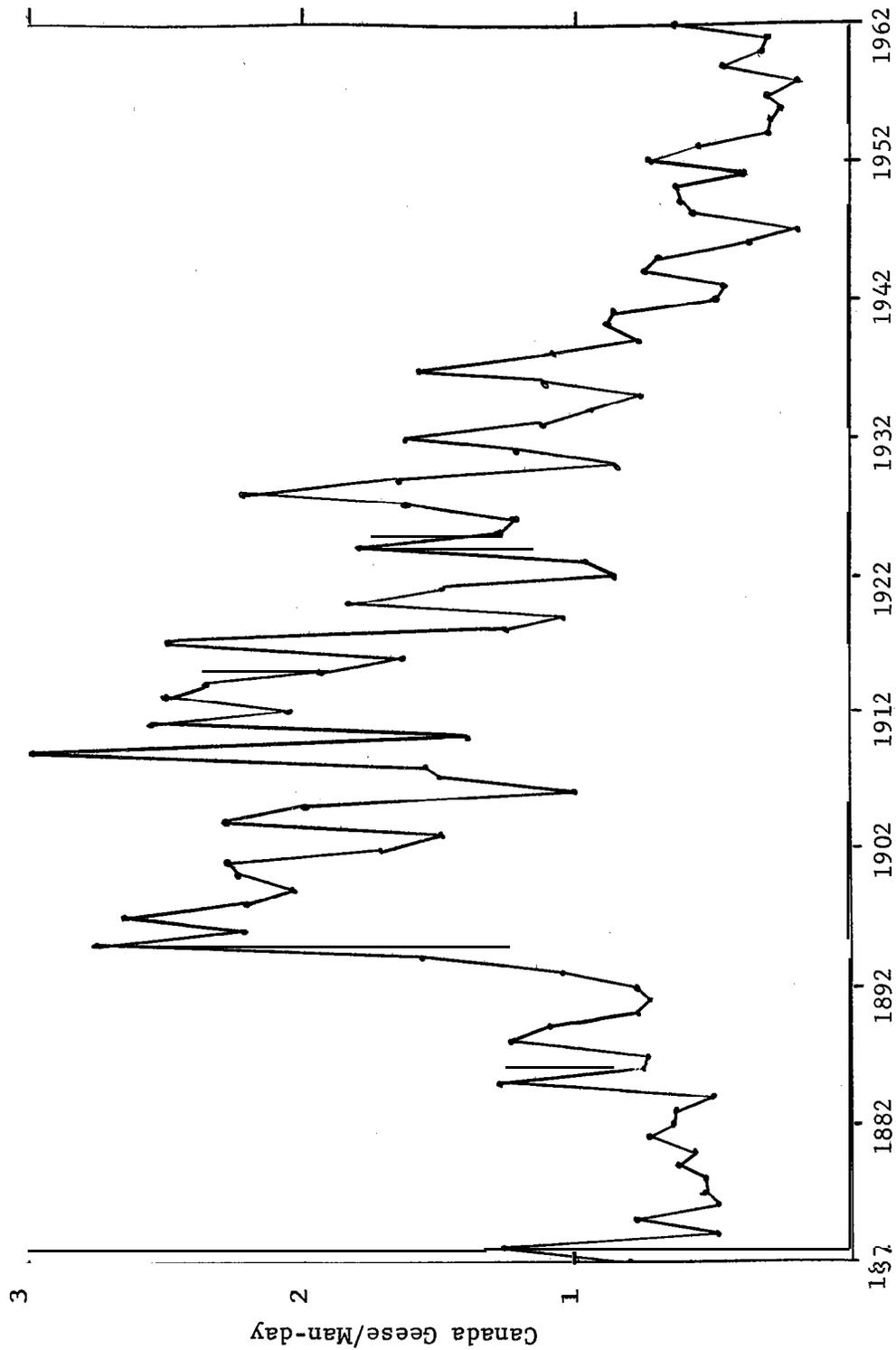


Figure \_\_\_\_\_ Annual Canada Geese Kill Per Man-day of Hunting from Ten Hunting Club Records on Back Bay, Virginia, and Currituck Sound, North Carolina, 1872-1962.



Number of Waterfowl Hunting Blinds on Back Bay and Currituck Sound

Some of the records of the numbers and **types** of blinds on Back Bay and Currituck Sound have been lost; all were difficult to substantiate. Recently the blinds on Back Bay comprised about 26 to 33 percent of the total on the Back ~~Bay~~**Currituck** Sound Area. The relationship of the number of blinds on the two areas has probably been fairly constant.

If this is true, the number of blinds on the area in recent years **is** two to four times the number from 1923-35. **Number of** blinds is not directly comparable to hunting pressure; but Critcher and Barber's estimates of man-days of hunting compare roughly to the number of licensed blinds. **The number** of blinds might be considered a rough index to hunting pressure.

Batteries, or sink boxes, were declared illegal after 1935. The number on **Currituck** Sound varied from 23 to 42; on Back Bay in 1930 there was a regulation limiting the number of sink boxes to 50, and I believe this had been in effect for several years.

Table \_\_\_\_\_ Available Records of Licensed Waterfowl Blinds on Back Bay and Currituck Sound.

Winter of	Total Blinds		(Sink Boxes or Batteries on Currituck Sound & /-j
	Back Bay	Currituck Sound	
1921	-	-	29
<b>1923</b>	<u>-1/</u>	134	-
1924	-	162	34
1925	-	180	36
1926	-	240	40
1927	-	251	39
1928	-	266	36
1929	-	<b>270</b>	39
1930	<u>-2/</u>	322	35
\$931	-	239	42
1932	-	240	35
<b>1933</b>	-	251	30
1934	-	199	25
<b>1935</b>	-	137	23
1947	-	457	-
<b>1948</b>	-	522	-
1949	-	554	-
1950	-	611	-
<b>1951</b>	-	654	-
1952	-	655	-
1953	-	679	-
1 9 5 4	-	675	-
1955	219	-	-
1956	226	627	-
1957	230	649	-
1958	<b>225<sup>3/</sup></b>	600	-
1959	<b>278</b>	605	-
1960	265	589	-
1961	268	558	-
1962	269	551	-

1/ Records not located.

2/ There was a limit of 50 sink boxes and 27 mat blinds in Back Bay in 1930, but no records located on the number of bush blinds.

3/ In 1958, there were also 77 shore blinds and an estimated 24 unlicensed marsh blinds. Probably about the same number of shore blinds and unlicensed marsh blinds existed in the other years.

4/ Included in total blinds on Currituck.

## WATERFOWL POPULATIONS

### Midwinter Waterfowl Inventories of Back Bay, Virginia, 1937-1965

The first waterfowl inventory of Back Bay was conducted in 1937. The data could either not be located or separated from total counts for 1941, 1946, 1948, 1952, and 1953. After 1958, the inventory data collected by the study personnel on Back Bay served as part of the official midwinter inventory. However, on Currituck Sound from 1960 on, the game management agent conducted an individual survey, and some minor differences exist because of different dates, different observers, etc.

The lowest waterfowl population recorded on a midwinter inventory of Back Bay was 9,925 in 1937. Populations increased progressively to the midwinter inventory of January 21, 1943, when the highest population recorded on any of the surveys occurred with 363,050 waterfowl. On that inventory 150,000 canvasback, 70,000 redhead, 40,000 scaup, and 60,000 coot were recorded, which were individual peaks for these species.

A decline in waterfowl to 20,500 occurred in 1944, the year after the peak, and thereafter a slow general increase continued to the second highest peak of 137,670 total waterfowl in 1956. The population of 45,000 snow geese in 1956 was partially responsible for the second peak in total waterfowl.

A general decline followed in 1957 to the third lowest population recorded of 15,015 total waterfowl. The decline continued in 1958 to the second lowest population of 12,209. It tended to increase to a 3-year plateau of 64,000 to 68,000 in 1960-63 and then declined in 1964 and 1965.

The trends in dabbling duck populations on Back Bay from the **midwinter** inventories have been somewhat different than total ducks. The dabbling duck populations increased from a moderate population of 3,050 in 1937 to the highest peak of 38,500 in 1942. They dropped in 1943 and stayed between approximately 4,000 to 8,600 until they increased to about 30,000 in 1950 and 1951. About 18,000 dabbling ducks were recorded in 1954 and 1955 with another increase to over 28,000 in 1956. With the exception of the 24,610 recorded in January 1963, the population of dabbling ducks has remained below 10,000 since 1956. The record low was 798 in 1959.

The midwinter inventories indicated diving duck use of Back Bay was even more erratic. From a population of 3,875 in 1937, the diving duck population erratically increased to 49,000 in 1942, with a great increase to 270,000 in 1943. It declined to a few thousand each year until it increased to a 6-year plateau of about 22,000 to 32,000 from 1950 through 1955. The diving duck population declined rapidly from 13,800 in 1956 to none in 1960. After an increase to 3,285 in 1961 the population of diving ducks increased to 15,815 in 1962. In the period 1963 through 1965 it ranged only from 575 to none.

The coot population on the Back Bay midwinter inventories ranged from none to 60,000. The population increased from a couple thousand in 1937 to 60,000 in 1943. From 1944 to 1948, only 1,100 to none were recorded. From 1949 to 1956 the population of coots was relatively stable between 15,500 and 25,000. In the next 9 years through 1965, the peak was 3,350 in 1961, and none was recorded in 1960, 1963, 1964, or 1965.

The Canada goose populations recorded on the midwinter inventories ranged from a low of 1,000 in 1937, the year the national refuge was established, to 26,285 in 1961. The population tended to increase to a peak of 20,000 in 1943. Except for 12,000 in 1950, the population was below 10,000 until 1956 when 18,700 Canada geese were recorded. In the next 9 years through 1965, the population barely exceeded 6,000 except for 22,320 in 1961 and the peak of 26,285 in 1963.

The snow goose populations on Back Bay have been erratic, but tended to increase. Because of their frequent use of marshland on the Virginia-North Carolina Stateline, they will be discussed only for the entire area.

The whistling swan populations increased from zero in 1937 to 5,000 in 1942. It declined to zero in 1947 and then tended to increase to 7,150 in 1956. The swan population dropped to 593 in 1957 and then increased progressively to 9,430 in 1961. The population dropped to 3,940 in January 1962, but reached a peak of 12,535 in January 1963. Only 78 and 77 whistling swan were recorded on the 1964 and 1965 midwinter inventories, respectively. Because swans feed almost exclusively on submerged aquatic vegetation, they seem to be a good yardstick to judge the habitat. Attention is called to the reportedly good growths of vegetation in 1955-56 and 1961-63 with correspondingly high swan populations. Extremely low swan populations occurred on Back Bay in the winters of 1963 and 1964--the two years of lowest aquatic vegetation production.

Midwinter Waterfowl Inventories of Currituck Sound, North Carolina, 1942-1965.

The peak populations of 1,016,870 and 704,300 waterfowl in 1942 and 1943, respectively, on Currituck Sound occurred in the same years as the peaks on Back Bay. The midwinter inventory of 1942 listed, in part, the following species populations: Canvasback 285,000, redhead 274,000, baldpate 73,000, pintail 44,000, ruddy duck 42,000, scaup 30,000, etc.

Waterfowl populations on Currituck Sound declined erratically from 384,150 in 1944 to 76,820 in 1953. In 1946 only 7,275 waterfowl were recorded, but this apparently was a temporary situation reportedly caused by weather and water levels. Since 1953 the population has fluctuated every 2 to 3 years, from a high of 229,900 in 1955 to a low of 59,844 in 1959.

On Currituck Sound the dabbling duck population dropped from the 1943 peak of 178,900 to 800 in 1946. Since that time it has erratically fluctuated from approximately 9,000 to 37,000. The peak of 37,000 occurred in January 1956, and the recent low was 4,731 in 1959. Currituck dabbling duck populations have exceeded those of the smaller area of Back Bay, except on the 1950, 1954, and 1963 midwinter inventories. No definite parallel relationships between the dabbling duck populations on the two areas are apparent, although a few high populations coincide.

A peak of 652,600 diving ducks was recorded in January 1942 on Currituck Sound. The population dropped to 125,000 by 1944, and other than the previously mentioned desertion of the area in 1946, declined to 18,227 diving ducks in 1949. There was a slight increase the next 3 years to

30,300 in 1952, followed by a decline to 5,925 in 1954. In 1955, there was an increase to 28,500 diving ducks and a drop to the low of only 245 in 1957. Thereafter there was a progressive increase to 31,400 in 1961, a decline to 2,700 in 1963, and about 20,000 in 1964 and 1965. The population of diving ducks on Back Bay was approximately the same or slightly exceeded the population on Currituck Sound in 1943, 1950, 1951, 1954, 1955, 1956, 1957, and 1962. In the other years the Currituck population was roughly, 3 to 15 times greater.

Ignoring 1946 because of adverse conditions, the coot population on Currituck Sound generally varied between 100,000 and 200,000 from 1942 to 1950. Between 1951 and 1954 it ranged from 30,000 to 67,000. In 1955 the coot population increased to 105,000 and then declined to 9,700 in 1958. For the next 7 years the coot population varied from 10,000 to 45,000. Although not correlated with the coot populations on Back Bay, both areas have shown a declining population. Currituck Sound appears to have been the more dependable habitat for coots.

There was an irregular decline in the population of Canada geese on Currituck Sound from highs of 50,000 to 60,000 in 1942 and 1943, to a low of 6,000 in 1953. It increased to over 20,000 in 1955 and 1956 and then dropped to roughly half that number in the period 1957-59. Since 1960 it has varied between 20,000 and 55,000 Canada geese. Frequently high Canada goose populations on Back Bay and Currituck Sound coincided, rather than a low population on one area being the result of a high population on the other area. Canada goose populations in Currituck Sound always exceeded those of Back Bay, except during the unusual conditions in 1946. Populations of about the same level occurred on both areas in January 1956 and 1963, which were incidentally two of the better years for aquatic plant production.

Whistling swan populations on Currituck Sound varied from 500 to 22,000. From 21,000 in 1942 there was an erratic decline to populations of less than 8,000 until 1956, when 10,300 were recorded. After a drop to 1,885 in 1957 the number of swan recorded on each midwinter inventory increased to 15,000 in 1961. The population dropped to 7,500 in 1962 and then increased to the peak population of 22,300 in 1964. It dropped again to 6,200 in 1965. Generally the trends were similar on both Back Bay and Currituck Sound, and, except in 1947 and 1964, it does not appear that one area was used at the exclusion of the other area. In 1964, food conditions were poor for swans on Back Bay and only 78 were recorded, whereas food conditions were adequate on Currituck Sound.

Swans were always recorded in greater abundance on Currituck Sound except in the winter of 1962-63, the year of peak use on Back Bay.

#### Combined Midwinter Inventories of Back Bay and Currituck Sound, 1942-1965.

The peak population of 195,700 dabbling ducks on the total area occurred in 1942. The dabbling duck population varied from 15,000 to 65,000 after 1942, with lesser peaks in 1951, 1956, and 1963. The low of 5,500 dabbling ducks was recorded in January 1959,

Diving duck populations on the **entire** area declined after the peak of 701,600 in 1942. Smaller peaks of 55,000, 51,200, 34,500, and 20,500, occurred in 1951, 1955, 1961, and 1964, respectively. A low of 1,717 diving ducks was recorded in January 1957.

The peak coot population of 225,000 on the entire area occurred in 1943. Lesser peaks of 130,000, 48,350, and 39,500 occurred in 1955, 1961, and 1965, respectively. The general decline is obvious. The lowest population of only 10,000 was recorded on the January 1963 midwinter inventory.

Canada goose population peaks on the entire area of 80,000, 40,900, 77,320, and 57,285 occurred on the 1943, 1956, 1961, and 1963 January inventories, respectively. The low of 11,157 occurred in January 1957. Average or higher Canada goose populations used the area during the study.

Annual comparison of the greater snow goose population can only be made on the entire area, because of its persistent use of marsh areas near the Virginia-North Carolina Stateline, and their habit of temporarily moving en masse. For this reason, I suspect that certain errors of omission or duplication have occurred in the midwinter inventory of snow geese in some years. The differences resulting from my continuous, count of the entire Back Bay-Currituck Sound Area, and the compilation of the "official" count using my Back Bay data and the game management data for Currituck Sound have been as follows:

	<u>Data by Sincock</u>			<u>"Official": Data</u>	
	<u>Back Bay</u>	<u>Currituck</u>	<u>Total</u>	<u>Combined</u>	<u>Inventories</u>
1959	18,500	10,500	29,000	29,000*	
1960	14,300	27,200	41,500	39,300	
1961	15,900	16,850	32,750	44,900	
1962	35,000	7,880	42,880	54,000	
1963	0	28,000	28,000	47,000	
1964	25,010	4,230	29,240	44,010	
1965	29,300	5,110	34,410	31,900	

\* In 1959 my data were used for the entire area.

The difficulty of estimating the number of snow geese in an undulating flock has been mentioned and the point here is not which observer was the more accurate; the accuracy in question is which flocks using either side of the Stateline were included in the "official" data for Currituck Sound along with my "official" data for Back Bay.

The decline indicated in my data in 1961 is in agreement with the observed low reproduction rate of only 2 percent that winter.

Regardless of which data are used, the disparity is not too great for the period 1959 through 1965. However, the problem existed in the area prior to that period.

Accepting the combined inventories from 1942 on at face value, the greater snow goose population erratically increased from the low of 2,300 in 1942 to a high of 66,200 in 1956. It generally varied between 20 to 40 thousand

in that period. After a drop to 25,000 in 1957 there was a general increase to 54,000 in 1962, followed by a decline to 31,900 in 1965. I postulate that some duplication occurred in the inventory of 1956 and peak populations did not occur until the early 1960's.

Whistling swan populations on the entire area declined from the peak of 25,970 in 1942 to 3,066 in 1949. It generally increased to 17,450 by 1956, and then dropped to the record low of 2,478 in 1957. The swan population increased progressively to a near-record peak of 24,430 in 1961. After a decline in January of 1962, it again reached about 23,000 in 1963 and 1964. In 1965 it dropped to 6,277.

The waterfowl population on Back Bay, Virginia, and Currituck Sound, North Carolina, as shown by the annual midwinter inventories each January, declined from over a million in 1942 and 1943 to about 200,000 in 1954. It increased to about 300,000 in 1955 and 1956, but rapidly declined to the lowest population of only 78,000 in 1957. The population has fluctuated between 88,000 and 256,000 since 1957.

Aerial Waterfowl Inventories of Currituck Sound, 1950-1952.

The North Carolina Wildlife Resources Commission conducted the first biweekly waterfowl inventories of Currituck Sound during the winters of 1950, 1951, and 1952.

Peak populations of **certain** waterfowl groups and species each year were as follows:

	<u>1950</u>	<u>1951</u>	<u>1952</u>
Dabbling ducks	19,645	28,861	28,835
Diving ducks	56,205	25,323	8,112
Redhead	27,485	16,335	2,100
Canvasback	12,045	6,058	4,175
<b>Scaup</b>	6,898	4,480	2,812
Total Ducks	73,489	38,789	37,240
Coot	97,620	61,000	58,050
Canada geese	32,476	29,789	45,777
Whistling swan	11,030	6,417	3,043
Total Waterfowl	176,615	152,366	134,860

These are individual peak populations and are not additive to any group.

During the period 1958 through 1963, the peak population of dabbling ducks ranged from 18,990 to 42,350, compared to a range of 19,645 to 28,835 in the earlier period.

From 1958 through 1963 the peak populations of diving ducks ranged from 14,575 to 63,535, whereas in the period 1950 through 1952 the peaks ranged from 8,112 to 56,205.

Coot **population** peaks from 1950 through 1952 were considerably higher, ranging from 38,050 to 97,620, compared to the range of 9,900 to 69,950 from 1958 through 1963.

Canada geese population peaks were generally higher in the 1958 through 1963 period with a range from 36,700 to 72,230, compared to a range of 29,789 to 45,777 from 1950 through 1952.

Whistling swan population peaks were also considerably higher from 1958 through 1963 with a range of 9,780 to 25,087, compared to 3,043 to **11,030** from 1950 through 1952.

Peak populations of waterfowl did not differ much, however, ranging from 134,860 to 176,615 in the period 1950 through 1952, and from 137,819 to 259,760 in the period 1958 through 1963.

Redhead peak populations on Currituck Sound ranged from 2,100 to 27,485 in the period 1950 through 1952, and from 2,200 to 12,750 from 1958 through 1963.

Canvasback peak populations ranged from 4,175 to 12,045 in the 1950 through 1952 period, and from 3,890 to 30,900 in the 1958 to 1963 interval.

**Scaup** peak populations ranged from 2,812 to 6,898 in the period 1950 through 1952, and from 50 to 5,000 in the 1958 through 1963 period.

Generally **the peak** populations were greater in the **period** 1958 through 1963 for dabbling ducks, diving ducks, Canada geese, whistling swan, and canvasback than in the 1950 through 1952 period.

Peak populations of coot, redheads, and **scaup** were generally higher in the earlier period on Currituck Sound.

## WATERFOWL POPULATIONS DURING THE INVESTIGATION, 1958-1964

### Methods of Conducting Aerial Inventories

During the winter of 1958-59, I conducted aerial inventories solely as observer and State and Federal pilots flew the specified routes in agency or rental aircraft. From 1959 through 1964 I served as both pilot and observer. In this latter period the Virginia Commission's Piper PA-18 Seaplane, located at Warden's Headquarters on Back Bay, was used most frequently with only occasional rentals of Tri-Pacers from the Norfolk Municipal Airport.

Prior to initiation of the aerial surveys, I had over 1,000 hours of experience in similar surveys elsewhere in the United States. This is mentioned because experience in aerial orientation, waterfowl behavior, estimating waterfowl numbers, and identifying waterfowl species is fundamental to reasonably accurate inventories. The frequency with which aerial inventories are conducted also contributes to more accurate inventories. The mind sometimes reels when attempting to estimate 40,000 or more undulating snow geese and the more frequent inventory accustoms the mind to coping with the numbers and flight patterns. With few exceptions, piloting oneself during aerial inventories materially contributes to accuracy.

Aerial inventories were generally conducted in the altitude range of 100 to 500 feet, depending on the expanse of open water to be scanned and concentrations of birds. On areas of large concentrations of Canada geese, e.g., the Back Bay National Wildlife Refuge and Dew's Quarter Island, the plane was climbed to 750 feet and throttled back to reduce disturbance to the geese and keep them on the water, thereby permitting a more accurate count. Where necessary these concentration areas were also covered at lower elevations to count and identify ducks intermingled with the geese.

Although positive identification was not always possible because of time limitations of the aircraft, all waterfowl were normally identified. An experienced observer is the best judge of whether a distant raft of ducks is a flock of redheads or mallards and making the identification in the field provides the data necessary to calculate diving duck days, or dabbling duck days, or whatever, while a category of "unidentified" ducks is of little further use. Normally less than 1 or 2 percent of the population would fall into the dubious class of "questionably identified" ducks.

Complete enumeration of waterfowl on Back Bay and Currituck Sound was relatively easy and accurate compared to many other habitats in the Southeast. Approximately  $3\frac{1}{2}$  to 4 hours were required for a complete count.

Waterfowl species and numbers were recorded on 20 subdivisions of the entire area from 1958 through the spring of 1960. After the acquisition of Mackay Island Refuge the data were recorded on 22 subdivisions to the end of the study in April 1964. Portions of the original waterfowl areas No. 7 and No. 11 formed the Mackay Island Refuge. Data are presented here only for the original 20 subdivisions. Refuge records contain further breakdowns of these data.

The normal flight pattern for inventories was to start at Warden's Headquarters on Back Bay, over the Back Bay Refuge marshes west of Long Island, north through Shipps Bay, North Bay, Sandbridge marshes, and then south along the eastern side of the entire area to Wright Memorial Bridge. Parallel east to west and west to east lines were flown over marsh areas and waterfowl concentrations on open waters. The distance between these east-west transect lines was normally about  $\frac{1}{4}$  to  $\frac{1}{2}$  mile but was adjusted according to marsh type and visibility as needed.

On the return flight north the western half of the area was inventoried, including the **Coinjock** Bay area, **Tulls** Bay, the North Landing River to Creeds Bridge, and the Great Marsh.

Depending on weather and other factors, inventories were normally conducted after 10 a.m., to allow return of the Canada geese from fields to the bay. On extremely calm days some snow geese, Canada geese, ducks, and swan moved to the ocean but occasional searches over the ocean to a distance of 5 miles offshore indicated that use was rather minimal. However, up to 30,000 redbreasted mergansers were frequently seen in the adjacent ocean but rarely use the Back Bay-Currituck Sound waters.

In 1958 a complaint was lodged from Currituck Sound that the aerial inventories were driving the waterfowl from the area and in deference the inventories were temporarily stopped. A similar complaint originated in the area in 1952 when the North Carolina waterfowl biologist was conducting aerial counts. His investigation of the complaint revealed very little opposition among the guides and duck clubs; and this was equally true in 1958. It was quite obvious from the air that there was no basis for the complaint for the waterfowl quickly settled back down. No similar complaints were made of the numerous military aircraft that use the area.

In addition to counting waterfowl, all disturbance factors in each waterfowl area were tallied; these data included number of occupied blinds, number of active or exposed boats, and number of commercial and sport fishermen. In some areas the density of these disturbance factors appeared to materially affect waterfowl distribution.

Fourteen inventories were conducted during the winter of 1958-59, 20 in 1959-60, 15 in 1960-61, 8 in 1961-62, 7 in 1962-63, and 7 in 1963-64, for a total of 71. During the winter of 1959-60, a few inventories were flown on consecutive days to ascertain differences in waterfowl distribution on hunting versus nonhunting days. These data did not indicate shifting of use.

Table \_\_\_\_\_ Comparison of the Dabbling Duck Population of Back Bay and Currituck Sound to the Remainder of the Atlantic **Flyway**, to the Remainder of Virginia and North Carolina, and to that of Maryland.

(Thousands of Birds)

Year	Atlantic Flyway		Virginia-North Carolina		Maryland	Back Bay Currituck
	Back Bay-Currituck	minus	Back Bay-Currituck	minus		
1949		990		128	109	29
1950		945		90	149	52
1951		1,146		174	138	62
1952		1,081		239	108	50 <sup>1/</sup>
1953		1,585		233	325	30 <sup>1/</sup>
1954		1,421		239	240	33
1955		1,826		311	491	48
1956		1,483		158	403	66
1957		1,211		148	302	17
1958		787		134	103	40
1959		1,043		112	111	6
1960		1,079		101	115	13
1961		1,049		118	116	26
1962		936		90	108	16
196-3		1,063		107	76	45
1964		1,041		131	128	20
1965		807		73	89	18

<sup>1/</sup> Missing values for Back Bay estimated on basis of adjoining years and Currituck data.

Table \_\_\_\_\_ Comparison of the Diving Duck Population of Back Bay and Currituck Sound to the Remainder of the Atlantic Flyway, to the Remainder of Virginia and North Carolina, and to that of Maryland.

(Thousands of Birds)

Year	Atlantic Flyway minus Back Bay-Currituck	Virginia-North Carolina minus Back Bay-Currituck	Maryland	Back Bay Currituck
1949	975	186	247	23
1950	1,293	100	389	47
1951	1,542	232	240	55
1952	2,056	533	144	60 <sup>1/</sup>
1953	2,382	305	567	28 <sup>1/</sup>
1954	1,864	204	841	29
1955	1,743	231	501	51
1956	1,502	103	417	28
1957	1,128	79	235	2
1958	917	85	174	4
1959	973	34	124	6
1960	1,044	93	185	18
1961	1,229	118	199	34
1962	1,183	91	185	31
1963	1,238	67	250	3
1964	1,508	43	316	21
1965	1,244	76	215	20

<sup>1/</sup> Missing values for Back Bay estimated on basis of adjoining years and Currituck data.

Table \_\_\_\_\_ Comparison of the Canada Goose Population of Back Bay and Currituck Sound to the Remainder of the Atlantic Flyway, to the Remainder of Virginia and North Carolina, and to that of Maryland.

(Thousands of Birds)

Year.	Atlantic Flyway minus Back Bay-Currituck	Virginia-North Carolina minus Back Bay-Currituck	Maryland	Back Bay Currituck
1949	276	131	102	42
1950	275	131	88	3 <sup>4</sup>
1951	364	150	57	<b>28</b>
1952	278	173	53	<b>221/</b>
1953	484	179	221	<b>121/</b>
1954	330	128	148	15
1955	487	148	260	34
1956	473	196	224	41
1957	358	122	181	11
1958	308	162	96	12
1959	282	159	69	20
1960	363	155	138	25
1961	469	162	241	77
1962	393	128	192	26
1963	4 2 4	142	197	57
1964	481	147	221	47
1965	450	103	242	33

1/ Missing values for Back Bay estimated on basis of adjoining years and Currituck data.

Table \_\_\_\_\_ Comparison of the Coot Population of Back Bay and Currituck Sound to the Remainder of the Atlantic *Flyway*, to the Remainder of Virginia and North Carolina, and to that of Maryland.

(Thousands of Birds)

Year	Atlantic Flyway minus Back Bay-Currituck	Virginia-North Carolina minus Back Bay-Currituck	Maryland	Back Bay Currituck
1949	693	8	17	170
1950	526	22	28	135
1 9 5 1	494	18	22	66.
1952	457	32	<b>16</b>	<b>83<sup>1/</sup></b>
1953	1,353	<b>51</b>	<b>40</b>	<b>50<sup>1/</sup></b>
1954	289	8	32	63
1955	486	50	75	130
1956	775	6	17	77
1 9 5 7	629	23	18	20
1958	383	26	9	11
1959	294	8	3	17
1960	278	7	5	37
1961	283	44	4	48
1962	201	28	4	29
1963	314	10	1	10
1964	366	4	1	21
1965	327	9	3	40

1/ Missing values for Back Bay estimated on basis of adjoining years and Currituck data.

Table \_\_\_\_\_, Comparison of the Swan Population of Back Bay and Currituck Sound to the Remainder of the Atlantic Flyway, to the Remainder of Virginia and North Carolina, and to that of Maryland..

(Thousands of Birds)

Year	Atlantic Flyway		Virginia-North Carolina		Maryland	Back Bay Currituck
	Back	minus Bay-Currituck	Back	minus Bay-Currituck		
1949		39		9	30	3
1950		24		1	22	7
1951		24		3	21	10
1952		27		4	23	9 <sup>1/2</sup>
1953		51		6	45	5 <sup>1/2</sup>
1954		48		3	45	5
1955		78		6	72	12
1956		22		2	20	17
1957		38		3	35	2
1958		23		6	17	5
1959		18		3	15	10
1960		<b>28</b>		5	23	13
1961		38		2	36	24
1962		29		3	26	11
1963		39		3	36	23
1964		40		3	37	22
1965		48		3	45	6

<sup>1/</sup> Missing values for Back Bay estimated on basis of adjoining years and Currituck data.

Table \_\_\_\_\_ Comparison of the Total Waterfowl Population of **Back** Bay and Currituck Sound to the Remainder of the Atlantic Flyway, to the Remainder of Virginia and North Carolina, and to that of Maryland.

(Thousands of Birds)

Year	Atlantic Flyway		Virginia-North Carolina		Maryland	Back Bay Currituck
	Back	minus Bay-Currituck	Back	minus Bay-Currituck		
1949	3,729			521	555	301
1950	3,577			386	705	298
1951	4,114			<b>688</b>	511	242
1952	4,661			<b>1,119<sup>1/</sup></b>	375	267
1953	6,670			846	1,245	166
1954	4,738			654	1,410	187
1955	5,495			590	<b>1,497</b>	306
1956	5,200			<b>389</b>	1,126	296
1957	4,038			409	804	78
1958	3,162			454	434	108
1959	3,084			349	330	89
1960	3,263			433	476	145
1961	3,580			495	637	256
1962	3,079			354	526	168'
1963	3,778			393	<b>570</b>	<b>185</b>
1964	3,837			351	711	176
1965	3,362			301	604	149

<sup>1/</sup> Missing value for Back Bay estimated on basis of **adjoining years** and Currituck data.

Inventories were normally conducted from the third week in September to the first week in April.

Peak Waterfowl Populations on Back Bay from 1958 to 1964

The peak population of each primary group or species of waterfowl for each year on Back Bay was as follows:

	<u>1958-</u> <u>1959</u>	<u>1959-</u> <u>1960</u>	<u>1960-</u> <u>1961</u>	<u>1961-</u> <u>1962</u>	<u>1962-</u> <u>1963</u>	<u>1963-</u> <u>1964</u>
Dabbling Ducks	5,405	22,806	10,865	13,097	24,640	9,055
Diving Ducks	1,458	5,615	11,745	15,815	13,430	<b>1,315</b>
coot	1,900	2,560	12,440	3,690	1,420	50
Canada Geese	12,778	27,123	29,710	22,140	25,485	15,386
Snow Geese	25,500	25,900	19,200	35,000	32,995	52,018
Whistling Swan	<u>3,431</u>	<u>15,968</u>	<u>9,430</u>	<u>10,915</u>	<u>12,535</u>	903
Total Waterfowl	33,880	75,051	68,781	77,441	65,180	57,894

Of course, these individual peaks occurred at different times and are not additive to total waterfowl.

The tables in the appendix present the populations of each species on each inventory.

Peak Waterfowl Populations on Currituck Sound from 1958 to 1964

The peak populations of each primary group or species of waterfowl each year on Currituck Sound was as follows:

	<u>1958-</u> <u>1959</u>	<u>1959-</u> <u>1960</u>	<u>1960-</u> <u>1961'</u>	<u>1961-</u> <u>1962</u>	<u>1962-</u> <u>1963</u>	<u>1963-</u> <u>1964</u>
Dabbling Ducks	18,990	19,789	37,069	30,413	42,350	22,183
Diving Ducks	14,575	29,682	53,351	51,078	41,235	63,535
coot	26,546	29,930	69,950	40,945	9,900	26,525
Canada Geese	42,700	52,765	72,230	57,725	71,790	36,700
Snow Geese	30,000	27,200	34,740	22,010	29,900	10,150
Whistling Swan	<u>18,095</u>	<u>21,721</u>	<u>18,575</u>	<u>9,780</u>	<u>22,060</u>	<u>25,087</u>
Total Waterfowl	145,381	137,819	259,760	177,600	165,185	173,035

These peaks are not additive to total waterfowl for they did **not occur** simultaneously.

The tables in the appendix present the population of each species on each inventory.

### Calculation of Waterfowl Days Use

Data are presented on the population of each species, on each date, for Back Bay, Currituck Sound, and both areas combined. Peak populations can be misleading in relating waterfowl use to habitat conditions. To overcome this, and more truly represent degree of use, "waterfowl days" and "waterfowl days per acre" have been calculated for each of the 20 subdivisions of the entire area.

Ten waterfowl days can represent either 1 duck for 10 days or 10 ducks for 1 day. Use data are presented for each major group of waterfowl, **e.g., dabbling** ducks, diving ducks, total duck, Canada geese, coot, snow geese, swan, and brant. Mergansers are not normally abundant on the area and are included under total ducks, but not listed with the two major subgroups. The few blue geese occasionally seen likewise did not justify separate calculation and are included only under total waterfowl.

The calculation of duck days use is a time-consuming procedure but it is justified by its importance. Several procedures *can* be used for approximate calculation of the statistic, e.g., graphing populations and measuring the area under the time-population curve with a planimeter, weighing the cut-out graph of the curve, or merely adding the populations on all inventories and multiplying by the number of days between the first and the last inventory. This latter method, is not recommended for it consistently produced an error in the Back Bay-Currituck Sound data of about 15 percent. The method used by the Branch of Refuges is to multiply totals from weekly inventories by 7 days and the number of inventories or weeks. This is acceptable with evenly spaced inventories. However, when a difference in time exists between inventories I consider it justified to accurately calculate the area or units under the curve by adding data from the first inventory to the second, the second to the third, etc. Each total *was* then multiplied by one-half the number of days between the two inventories. This constant was used rather than averaging the totals of two inventories and multiplying by the number of days between inventories.

The sum of the products was the total duck days for each area. The areas were of varying size and it was necessary to divide days use by the acreage to permit comparison of degree of use and density. Both statistics, days use, and days use per acre were of value in relating populations to habitat.

### Waterfowl Days Use of Back Bay and Currituck Sound, 1958 to 1964

The waterfowl days use of both Back Bay and the entire area reached a peak in the winter of 1962-63. Currituck Sound, however, had peak waterfowl days use in 1960-61. On Currituck Sound waterfowl days use increased from about 9.5 million in 1958 to 11.6 million days use in 1959. It increased to about 18.4 million days use in 1960 and then leveled out between 17 and 17.9 million from 1961 through 1963.

On Currituck Sound the duck days use increased progressively from 2.7 million in 1958 to **8.3** million in 1963. The increase was primarily in diving duck days. Canada geese days use increased from 2.1 million in 1958 on Currituck Sound to 5.4 million in 1960, and then varied between 4.8 million and 5.5 million from 1961 to 1963. The coot days use reached a peak in 1960 at 4.5 million, and then declined erratically. Swan days use of Currituck increased fairly progressively from 0.8 million in 1958 to 1.8 million in 1963.

On Back Bay the total duck days use increased from a low of 0.5 million in 1958 to a high of 3.1 million in 1962-63. It then declined to 0.8 million in 1963-64. Canada geese days use increased from 1 million in 1958 to 2.3 million in 1960. It declined to 1.8 million in 1961, but then reached a peak of 3 million Canada goose days use in 1962. It declined to **1.3** million in 1963. Coot days use of Back Bay has declined from the low peak of 0.6 million in 1960 to a mere 800 days use in 1963. Swan days use of Back **Bay\*increased** rapidly from 0.16 million in 1958 to 0.6 million in 1959. It remained relatively constant and then increased further in 1962 to 1.0 million. In 1963, it declined to a low of only 35 thousand.

On the entire Back Bay-Currituck Sound Area, total duck days increased progressively from a low of 3.2 million in 1958 to a high of 9.4 million in 1962-63. Total duck use remained high in 1963 at 9.1 million. Both dabbling and diving ducks were involved in the general increase. Canada geese days use increased from a low of 3.2 million in 1958 to a high of 8.6 million in 1962-63; it then declined to **5.9** million in 1963. Coot days use of the entire area increased from 2.5 million in 1958 to a peak of 5.1 million in 1960, It then tended to decline to a low of 1.0 million in 1962-63. In 1963, it increased to 2.5 million. Snow geese use generally increased each year from a low of **2.6** million days in 1958 to about 4.9 million in 1962 and 1963. Swan days use increased from a low of 1 million in 1958 to about 2 million in 1959 and 1960. It declined slightly to 1.7 million in 1961-62, and increased to a peak of 2.8 million in **1962-63**. In 1963, swan days use declined to **1.9** million. Waterfowl days use of the entire area was lowest in 1958 with only 12.6 million, It increased to 17.4 million in 1959, and then remained at a fairly constant level of 24.2 to 26.7 million thereafter. The peak of 26.7 million waterfowl days use occurred in 1962-63,

Table . Comparison of Waterfowl Days Utilization of Back Bay, Virginia, and Currituck Sound, North Carolina.  
(Waterfowl Wintering Seasons of 1958-59 through 1963-64)

Date-Location	Waterfowl Days								
	Dabbling Duck Days	Diving Duck Days	Total Duck Days	Can. Geese Days	Coot Days	Snow Geese Days	Swan Days	Brant Days	Total Waterfowl Days
<u>Back Bay, Virginia</u>									
9/24/58-3/26/59:	443,256	87,406	530,662	1,055,313	109,404	1,193,368	161,748	7,217	3,055,712
9/19/59-4/8/60:	1,061,031	177,399	1,238,430	1,298,909	62,351	2,501,925	602,892	0	5,704,507
9/20/60-4/9/61:	1,026,969	414,281	1,441,250	2,320,551	623,986	1,659,365	682,447	0	6,727,599
9/23/61-4/6/62:	1,234,474	1,015,519	2,249,993	1,827,495	189,388	2,415,760	682,308	--	7,364,944
9/19/62-4/9/63:	2,484,166	704,727	3,192,013*	3,041,522	94,282	2,245,356	1,037,479	0	9,610,812
9/17/63-4/5/64:	748,512	55,554	804,066	1,305,319	800	4,116,656	35,250	0	6,262,091
<u>Currituck Sound, North Carolina</u>									
9/24/58-3/26/59:	1,818,331	879,383	2,697,714	2,134,009	2,414,369	1,445,023	800,772	65,428	9,557,315
9/19/59-4/8/60:	1,947,573	1,212,478	3,160,051	3,279,992	216,471,57	1,232,935	1,330,919	0	11,651,054
9/20/60-4/9/61:	2,337,685	2,438,381	4,776,066	5,363,246	4,457,084	2,398,350	1,385,904	0	18,380,650
9/23/61-4/6/62:	2,858,429	3,094,850	5,953,279	4,824,937	3,660,783	1,685,730	977,653	--	17,102,382
9/19/62-4/9/63:	3,578,947	2,596,565	6,185,501*	5,525,171	925,906	2,693,505	1,722,590	0	17,052,673
9/17/63-4/5/64:	2,557,987	5,743,274	8,301,261	4,558,455	2,463,643	725,681	1,867,106	0	17,916,146
<u>Back Bay, Virginia, and Currituck Sound, North Carolina</u>									
9/24/58-3/26/59:	2,261,587	966,789	3,228,376	3,189,322	2,521,773	2,638,391	962,520	72,645	12,613,027
9/19/59-4/8/60:	3,008,604	1,389,877	4,398,481	4,578,901	2,709,508	3,734,860	1,933,811	0	17,355,561
9/20/60-4/9/61:	3,364,654	2,852,662	6,217,316	7,683,797	5,081,070	4,057,715	2,068,351	0	25,108,249
9/23/61-4/6/62:	4,092,903	4,110,369	8,203,272	6,652,432	3,850,171	4,101,490	1,659,961	--	24,467,326
9/19/62-4/9/63:	6,063,113	3,301,292	9,377,514*	8,566,693	1,020,188	4,948,861	2,760,067	0	26,663,485
9/17/63-4/5/64:	3,306,499	5,798,828	9,105,327	5,863,774	2,464,443	4,842,337	1,902,356	0	24,178,237

\* Includes miscellaneous utilization.

Table . Comparison of Waterfowl Days Utilization per Acre of Back Bay, Virginia, and Currituck Sound, North Carolina. (Waterfowl Wintering Seasons of 1958-59 through 1963-64)

Date-Location	Days Per Acre										Total Water-fowl Days
	Dabbling Duck Days	Diving Duck Days	Total Duck Days	Can. Geese Days	Coot Days	Snow Geese Days	Swan Days	Brant Days	Total Brant Days		
<u>Back Bay, Virginia</u>											
9/24/58-3/26/59:	12.2	2.4	14.6	29.0	2.9	32.8	4.4	0.2	83.9		
9/19/59-4/8/60:	29.1	4.9	34.0	35.7	1.7	68.7	16.5	0.0	156.6		
9/20/60-4/9/61:	28.2	11.3	39.5	63.7	17.1	45.6	18.7	0.0	184.6		
9/23/61-4/6/62:	33.9	27.9	61.8	50.2	5.2	66.3	18.7	---	202.2		
9/19/62-4/9/63:	68.2	19.3	87.5	83.5	2.6	61.6	28.5	0.0	263.8		
9/17/63-4/5/64:	20.5	1.5	22.1	35.8	0.0	113.0	1.0	0.0	171.8		
<u>Currituck Sound, North Carolina</u>											
9/24/58-3/26/59:	16.6	8.0	24.6	19.5	22.1	13.2	7.3	0.6	87.5		
9/19/59-4/8/60:	17.8	11.1	28.9	30.0	24.2	11.3	12.2	0.0	106.6		
2/20/60-4/9/61:	21.4	22.3	43.7	49.1	40.8	21.9	12.7	0.0	168.2		
9/23/61-4/6/62:	26.2	28.3	54.5	44.2	33.5	15.4	8.9	---	156.5		
9/19/62-4/9/63:	32.8	23.8	56.6	50.6	8.5	24.6	15.8	0.0	156.2		
9/17/63-4/5/64:	23.4	52.6	76.0	41.7	22.5	6.6	17.1	0.0	163.9		
<u>Back Bay, Virginia, and Currituck Sound, North Carolina</u>											
9/24/58-3/26/59:	15.5	6.6	22.1	21.9	17.3	18.1	6.6	0.5	86.5		
9/19/59-4/8/60:	20.6	9.5	30.1	31.4	18.6	25.6	13.3	0.0	119.1		
9/20/60-4/9/61:	23.1	19.6	42.7	52.7	34.8	27.8	14.2	0.0	172.2		
9/23/61-4/6/62:	28.1	28.2	56.3	45.7	26.4	28.1	11.4	---	167.9		
9/19/62-4/9/63:	41.6	22.7	64.3	58.8	7.0	33.9	18.9	0.0	183.0		
9/17/63-4/5/64:	22.7	39.8	62.5	40.2	16.9	33.2	13.1	0.0	165.9		

\*Includes miscellaneous utilization/acre.

Waterfowl Days Use Per Acre of the Major Waterfowl Groups and Species on Back Bay and Currituck Sound, 1958-1963

	1958-1959		1959-1960		1960-1961		1961-1962		1962-1963		1963-1964	
	BB	CS	BB	CS	BB	CS	BB	CS	BB	CS	BB	CS
Dabblers	12.2	16.6	29.1	17.8	28.2	21.4	33.9	26.2	68.2	32.8	20.5	23.4
Divers	2.4	8.0	4.9	11.1	11.3	22.3	27.9	28.3	19.3	23.8	1.5	52.6
Total Ducks	14.6	24.6	34.0	28.9	39.5	43.7	61.8	54.5	87.6	56.7	22.0	76.0
Canada Geese	29.0	19.5	35.7	30.0	63.7	49.1	50.2	44.2	83.5	50.6	35.8	41.7
coot	29.0	22.1	1.7	24.2	17.1	40.8	5.2	33.5	2.6	8.5	0.0	22.5
Snow Geese	32.8	13.2	68.7	11.3	45.6	21.9	66.3	15.4	61.6	24.6	113.0	6.6
Swan	4.4	7.3	16.5	12.2	18.7	12.7	18.7	8.9	28.5	15.8	1.0	17.1
Total ... Waterfowl	83.9	87.5	156.6	106.6	184.6	168.2	202.2	156.5	263.8	156.2	171.8	163.9

Back Bay had greater densities of dabbling ducks than Currituck Sound except in 1958 and 1963; the two years of least vegetation in Back Bay. The density of dabbling ducks was highest on Back Bay, and the difference from Currituck Sound was greatest in 1962; the most productive year for aquatics in Back Bay.

Diving duck densities were greatest in all years on Currituck Sound; the difference was greatest in 1963, the least productive year for aquatics in Back Bay.

Canadageese densities were greatest on Back Bay in all years except 1963.

In 1958, the density of coots was greatest on Back Bay, but thereafter coots virtually abandoned Back Bay and densities were highest on Currituck Sound.

Snow geese densities were highest in all years on Back Bay.

The densities of whistling swan were greatest on Back Bay from 1959 through 1962 when aquatic vegetation was fairly abundant on Back Bay. In 1958 and 1963, when aquatic vegetation was scarce on Back Bay, Currituck Sound had the higher densities of swan,

Comparison of the Midwinter Inventories of Back Bay and Currituck Sound to Other Areas, and Aquatic Food Supply

Data are presented in tables and graphs on waterfowl populations of the Back Bay-Currituck Sound Area, the remainder of the Atlantic Flyway, Virginia and North Carolina minus Back Bay and Currituck Sound, and Maryland.

Although dabbling duck populations appeared to generally follow the same trends on all areas their populations on Back Bay and Currituck Sound from 1949 through 1965 were not significantly correlated with total flyway dabbling duck populations ( $r=.379$ ), or the total of Virginia, North Carolina, and Maryland populations ( $r=.387$ ) at the 5 percent level of significance ( $r=.482$  required),

Increased populations of dabbling ducks in Maryland, or in the remainder of Virginia and North Carolina did not appear to suppress populations on **the study** area. However, between 1956 and 1959 the decline in populations of dabbling ducks was much greater on Back Bay and Currituck Sound than on **the** other areas. Poor habitat conditions on Back Bay and Currituck Sound may have been the reason. Comparison of the dabbling duck population of Back Bay-Currituck Sound for the 6 years from 1958-63 to the standing crop of submerged aquatics revealed a nonsignificant correlation at the 5 percent level of  $r=.650$ . Comparison of percent of the total study area population of dabblers using Back Bay only, to the food supply in Back Bay shows a significant correlation of  $r=.81$  at the 5 percent level, This suggests that 'dabbling duck populations are determined by food supply to a greater degree on Back Bay than they are on the entire study **area**.

The population trends of diving ducks, excluding sea ducks, of Back Bay and Currituck Sound were related to the remainder of the Atlantic Flyway from 1949 through 1965; the correlation of  $r=.559$  was significant at the 5 percent level of significance. The nonsignificant negative correlation of  $r=.087$  of diving duck populations on the study area compared to **standing crops** of aquatics from 1958 through 1963, demonstrates further that the total supply of diving ducks has been the more limiting factor on their use of Back Bay and Currituck Sound in recent years. A stronger positive correlation of  $r=.437$  is obtained in comparison of the percent of the total study area diving ducks on Back Bay with the food supply of Back Bay. This is still not significant at the 5 percent level but it is suggestive that food conditions may be more critical on Back Bay than on Currituck Sound.

After 1955, there was a similarity in the trends of the diving ducks on all four areas shown for the Atlantic Flyway. However, between 1949 and 1955 it appeared that the populations in Virginia and North Carolina were occasionally suppressed by favorable conditions in Maryland.

The annual population of Canada geese on Back Bay and Currituck Sound was significantly-correlated ( $r=.576$ ) at the 5 percent level with the total Atlantic Flyway population for the 17 years from 1949 through 1965. The correlation ( $r=.772$ ) of Canada goose populations with the standing crop of submerged aquatics from 1958 through 1963 was not significant at the 5 percent level.

From 1950 through 1953 Canada goose use increased in the remainder of Virginia and North Carolina, but decreased on the study area. The Back Bay-Currituck Sound Area must vie with the Mattamuskeet-Pea Island Area in North Carolina, and other areas, for the supply of Canada geese. "Short-stopping" of Canada geese in Maryland did not appear to be a primary problem limiting use of Back Bay and Currituck Sound.

As indicated in the discussion of the relationships of populations to food supply and disturbance on individual subdivisions of Back Bay and Currituck Sound, disturbance was considered to have significant effect on distribution of Canada geese and diving ducks on subdivisions. Disturbance may have been important in limiting use of the entire area by these two waterfowl groups.

The coot population of Back Bay and Currituck Sound from 1949 through 1965 was significantly correlated with the total for the remainder Virginia-North Carolina and Maryland, ( $r=.502$ ), but the correlation to the remainder of the Atlantic Flyway ( $r=.293$ ) was not significant at the 5 percent level.

The coot population on Back Bay and Currituck Sound was not significantly correlated with the standing crop of submerged aquatics ( $r=-.01$ ) from 1958 through 1963.

In recent years the coots abandoned Back Bay and used Currituck Sound almost exclusively. The trends in coot populations on adjoining areas indicated that the attraction of those areas was not the cause of less use of Back Bay and Currituck Sound. The reason for the lower use by coot is not known.

Virtually the entire whistling swan population on the Atlantic coast uses this tristate area, and Maryland has always wintered the most. Generally the **annual trends** in swan populations in Maryland are contrary to those in Back Bay and Currituck Sound; suggesting a general "**spillover**" into the latter area. The swan populations of Back Bay and Currituck Sound from 1949 through 1965 were not significantly correlated ( $r=.422$ ) with the total Atlantic population. However, the swan population of Back Bay and Currituck Sound from 1958 through 1963 **was** significantly correlated at the 1 percent level ( $r=.926$ ) with the standing **crop** of submerged aquatic plants.

Inasmuch as the greater snow geese **do** not feed on the submerged aquatics, the nonsignificant correlation of  $r=.128$  in the paired comparison of aquatics to populations from 1958 through 1963 was to be expected. Because the bulk of the snow geese winter in the area there is, of course, significant relationship of total flyway population to that of the study area.

The lack of positive relationship of the **populations** of diving ducks, dabbling ducks, Canada geese and coot to the aquatic food supply on the entire area from 1958 through 1963 does not necessarily imply that such relationship did not exist prior to 1958. As shown, a greater relationship of populations of dabbling ducks, diving ducks, Canada geese, and coot to food conditions existed on Back Bay than on the entire area. The swan population, which consumed about one-half of all aquatics consumed by waterfowl, **was** significantly correlated at the 1 percent level of significance with the aquatic plant supply.

Significant correlation at the 5 percent level was shown for the relationship of Atlantic Flyway populations to study area populations of diving ducks and Canada geese. Dabbling ducks, swan, and coot populations were not significantly related to flyway populations.

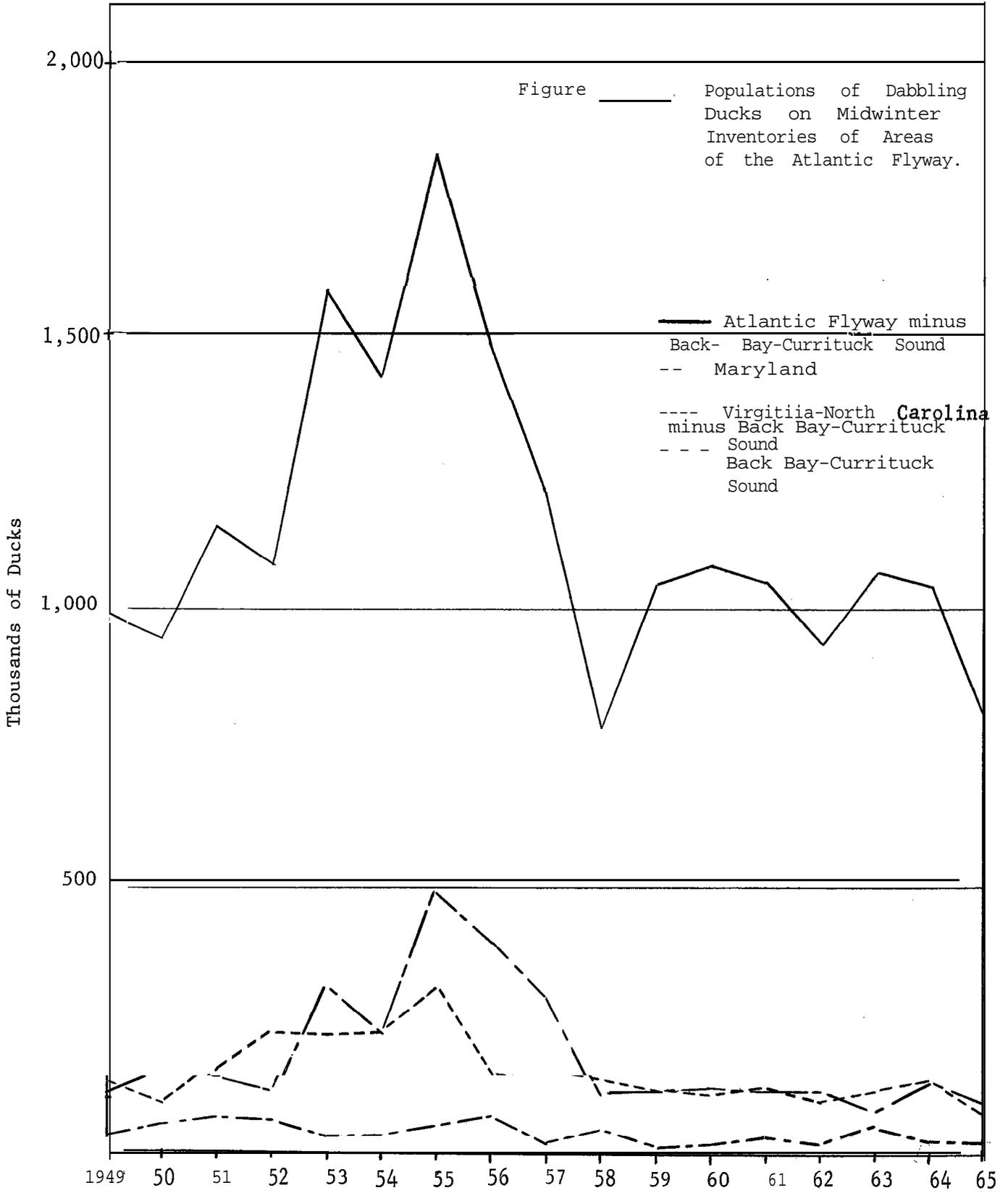


Figure 1. Populations of Diving Ducks on Midwinter Inventories of Areas of the Atlantic Flyway.

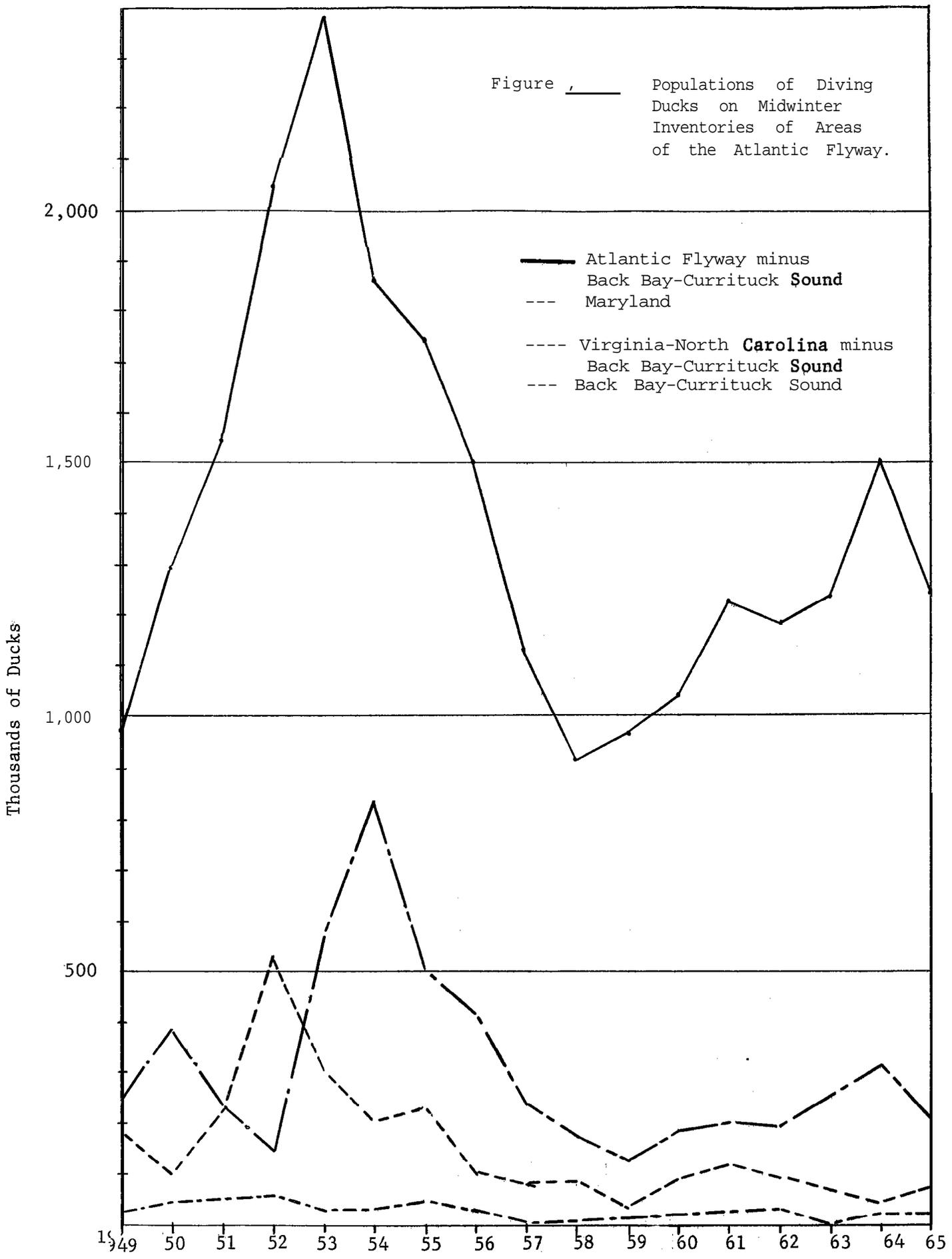
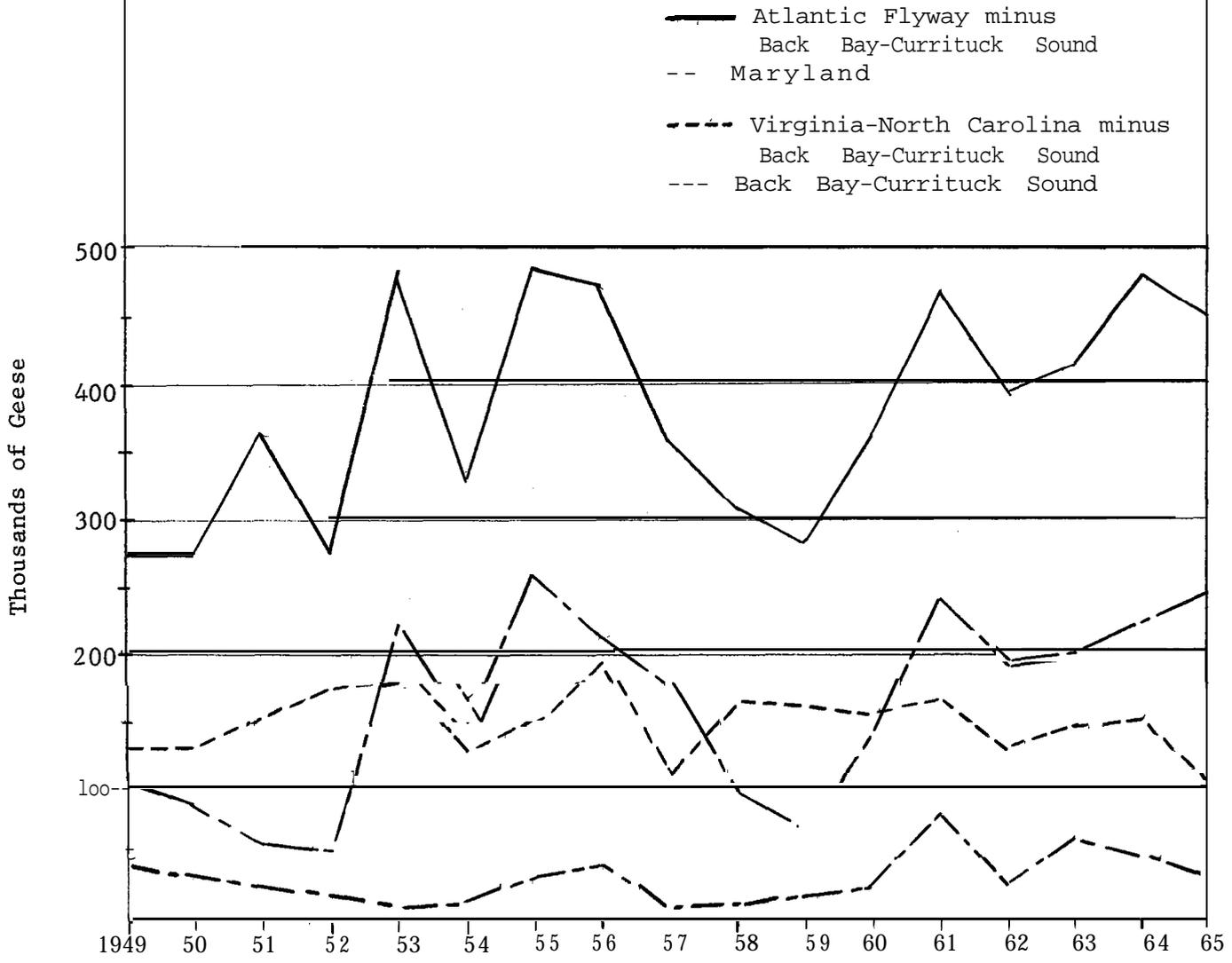
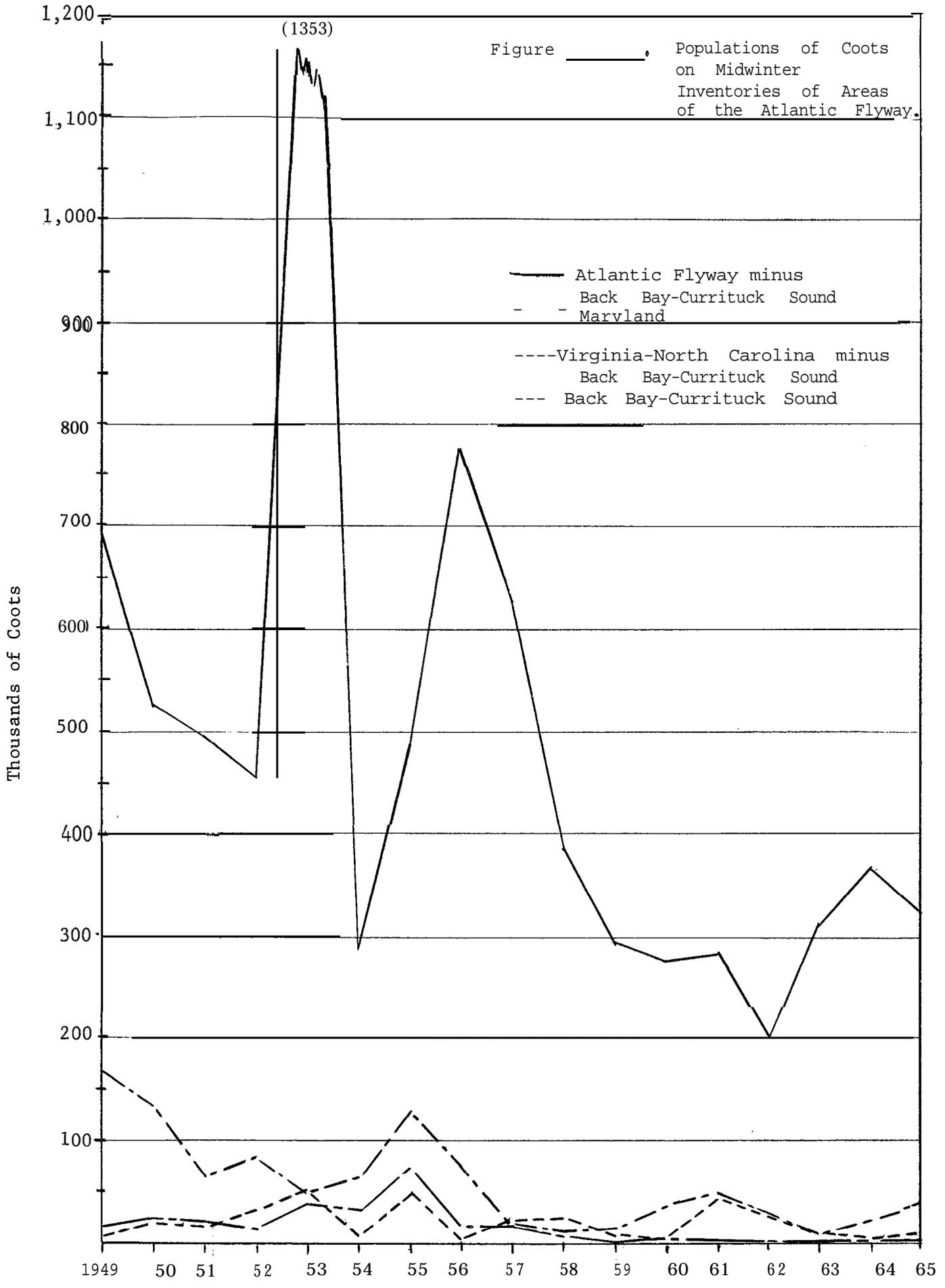
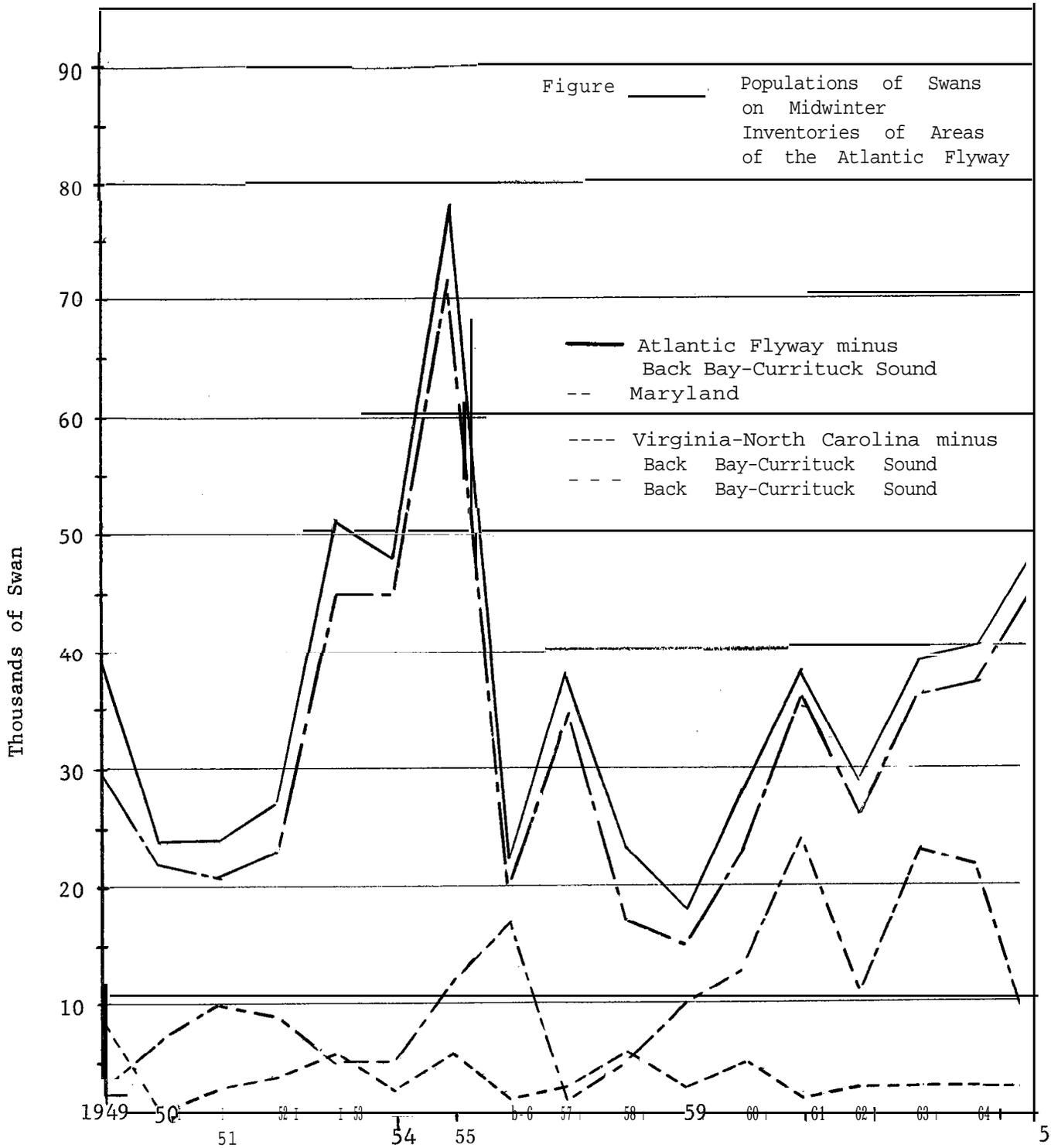


Figure \_\_\_\_\_ Populations of Canada Geese on Midwinter Inventories of Areas of the Atlantic Flyway.







## Relationship of Waterfowl Use to Disturbance Factors and Food Conditions

In many areas in the United States, it is contended that disturbance has reduced waterfowl use of certain habitats. Many good habitats for waterfowl, teeming with foods, receive little waterfowl use because of human activities.

It was suggested that human activities, e.g., boating, blind construction, hunting, fishing, water skiing, etc. were driving waterfowl away from Back Bay and Currituck Sound. Such human activity was the primary reason that the North Carolina Wildlife Resources Commission and Currituck County established a sanctuary in the open sound between **Churchs** Island and Poplar Branch about 1958.

The increased number of blinds in recent years, to more than 900, made a veritable "pin-cushion" pattern over the best waterfowl feeding and flight areas on Back Bay and Currituck Sound. The States required that blinds be at least 500 yards apart. No "jump" hunting was permitted in the marshes. Transportation by boat to and from the offshore blinds, and most of the shore blinds, occurred at least twice a day. Miscellaneous boating and purposeful rallying of waterfowl were common. Baiting was frequently used in certain sections of the area and near the end of December wind: rows of grain occurred **along the shore.**

In addition to activities on land and water, there are three restricted areas for military aircraft to practice bombing, gunnery, and sea-fescue. These activities precede and follow the waterfowl hunting season, but the military services cooperate by ceasing activities during the season. Military aircraft are also supposed to remain at least 1,500 feet above the refuges, but there are occasional infractions.

If most waterfowl blinds were in use on most days, there would be little doubt that the human activity would be a major factor forcing waterfowl from the area. Most blinds were not occupied, however, In 1959 about 46 blinds were occupied per day on Back Bay, and 89 on Currituck Sound. In 1960 the average number of occupied blinds was 27 per day on Back Bay and 56 per day on Currituck Sound. The totals for the entire area were approximately 135 and 83 occupied blinds **per** day in 1959 and 1960, respectively. This represents 13.7 and 8.7 percent of the estimate of 984 blinds in 1959 and 955 blinds in 1960, respectively, that were licensed or unlicensed. This was variable and at times no blinds were occupied on Back Bay. In 1959, on one count on November 21 there were 312 occupied blinds on Back Bay and Currituck Sound; whereas, the greatest number of occupied blinds in 1960 was 126 on December 10.

Was this degree of hunting activity and associated boating **activity** a factor limiting use by dabbling ducks, diving ducks, or Canada geese? Naturally, the amount of disturbance that waterfowl will tolerate on an area is related to the quantity and type of waterfowl food. For example, it is widely acknowledged that waterfowl will use baited areas in the face of heavy hunting pressure.

These human disturbance factors were measured in conjunction with the periodic waterfowl inventories on the 20 subdivisions, or waterfowl areas, of the entire area. The graphs illustrate the relationship of the density of use by dabbling ducks, diving ducks, and Canada geese to human disturbance and food conditions on each of the 20 waterfowl areas. Human disturbance was measured by counting the number of occupied blinds and active or exposed boats in each area during all aerial inventories of waterfowl. Boats tied at dock areas were not included. The disturbance factors were expressed as the number per acre, as were the waterfowl days use during the hunting season (see appendix).

Disturbance factors were plotted against waterfowl use during the hunting season for each area. The average waterfowl use and the average disturbance factors per acre for all 20 areas were shown as bisecting lines forming 4 quadrants. As shown, the areas in the upper right quadrant had above average disturbance and use; the upper left quadrant represented below average disturbance but above average use; the lower left quadrant represented below average disturbance and use; the lower right quadrant represented above average disturbance and below average use.

Based on overall assessment of the waterfowl food supply and availability, as shown by the master vegetation survey, the transect survey, and the marsh mapping, each of the 20 waterfowl areas was assigned a qualitative rating of good, fair, or poor. Because of water depth, habitat type, and food preferences, these ratings differed in some instances for dabbling ducks, diving ducks, and Canada geese. The rating of food abundance and availability of each area was shown in the table for three groups of waterfowl.

The good, fair, and poor ratings are illustrated on the graphs as squares, triangles, and circles, respectively. The number within the symbol represents the waterfowl area.

On the 1959-60 graph of dabbling duck use, the only three areas in the quadrant of "above average disturbance and above average dabbling duck use" were known to be heavily baited areas. They also were good natural feeding areas for waterfowl. The highest dabbling duck use was in area #4, the Back Bay National Wildlife Refuge. This was in the upper left quadrant representing "high dabbling duck use and below average disturbance."

There is a definite grouping of areas by food conditions. The lower left quadrant, showing "below average disturbance and below average dabbling duck use," contains the greatest proportion of the areas with poor food ratings.

Area #17, within which the Currituck Sound Sanctuary was established, should be noted. In 1959 the dabbling and diving duck use was below average, and Canada geese use was only slightly above average. Waterfowl had not yet become accustomed to the new sanctuary. However, by 1960,

even though disturbance was slightly increased, waterfowl use increased appreciably. The area was heavily used thereafter. No notable improvement in food abundance or availability occurred, or is likely to, in this fairly deep, open water sanctuary. The increased use of the area seemed to demonstrate a definite response by waterfowl to the sanctuary. Prior to establishment of the sanctuary and prescribed passage lanes for boats, disturbance was at a high level.

Area #20, the 18,060-acre area at the south end of Currituck Sound, ranks among the lowest in waterfowl use considering the relatively low level of disturbance. This deep, rough water area is obviously not of much value to waterfowl, either for resting or feeding. Canada geese used the area slightly in 1960 and following years, on calm days, apparently as a resting area to escape disturbance on areas to the north.

Area #3, Shipps Bay, had the highest level of disturbance in both 1959 and 1960. This area is immediately adjacent to the Back Bay National Wildlife Refuge. It appeared to be a good habitat for diving ducks and Canada geese, but food availability for dabbling ducks was poor. The density of blinds, hunting, and boating was a major factor limiting use of this area at times. On a few nonhunting days and occasionally at night, 2,000 or more waterfowl were observed on the area.

Juxtaposition of these 20 waterfowl areas was also a factor having considerable bearing on the relationship of waterfowl use, disturbance, and food conditions. It complicated a graphical, or mathematical, analysis of these relationships, but it was frequently self-evident. For example, the combined disturbance of Area #2, North Bay, and Area #3, Shipps Bay, may have been responsible for the lower use of Area #1, the Sand Bridge Marsh, by dabbling ducks in 1959. In 1960, when the combined disturbance of Areas #1, #2, and #3 was less, the utilization of Area #1 was much higher.

The lower right quadrant of the graph for dabbling ducks in 1960 representing "above average disturbance and below average use," contains Areas #2, #3, #5, and #6, all of which encompass Area #4, the Back Bay National Wildlife Refuge. This reflects the hunting activity that would be expected around the refuge perimeter.

In both years, all areas that appeared in the upper right quadrant of the graph were known to be baited with corn or mixed grains.

In both 1959 and 1960, all areas with above average dabbling duck use, except the Currituck Sanctuary, had good food abundance and availability. All areas with below average dabbling duck use, except Areas #1 and #16 in 1959 and Area #11 in 1960, had only fair or poor food abundance and availability.

The two lower quadrants on the graph of dabbling duck use, represent below average use and, in essence, the primary problem. Was it lack of food or excessive disturbance that decreased waterfowl use of these areas? Probably both factors are responsible. There is a slight tendency in the lower quadrants for dabbling duck use to be higher on those areas with good or fair food conditions than those areas with poor food conditions, particularly in 1959. This suggests that improving food conditions would increase dabbling duck use of these areas, with the prevailing level of disturbance.

Dabbling duck use of those areas in the lower left quadrant is not primarily limited by disturbance. In the lower right quadrant, representing "above average disturbance and below average use," disturbance most likely is important in reducing dabbling duck use of Areas #1, #16, and #3.

Waterfowl tolerance of disturbance is, of course, relative to the level of disturbance on adjoining areas. The table on the relative percentage of disturbance by areas shows the entire Back Bay Area had 59 and 56 percent of the relative disturbance on the entire area. Disturbance from boating was about equal on Back Bay and Currituck Sound. However, relative hunting disturbance was greater on Back Bay for it had 62 and 58 percent of the total hunting density in 1959 and 1960, respectively.

The graphs of diving duck use in relationship to disturbance and food show a somewhat different response to these factors. Of course, the measurement of disturbance is the same for dabbling ducks, diving ducks, and Canada geese on each area; only the use and food conditions varied by waterfowl group. For the diving ducks a greater number of areas with good food conditions are below the average in use. These areas are #3, #6, #9, #10, and #16 in both years, and #7 in 1960. All five areas had the highest density of disturbance, good food conditions, and low populations of diving ducks. There is a slight indication of increased use with decreased disturbance on these five areas, In both 1959 and 1960, the only area with above average diving duck use when 'disturbance was above average was Area #18, a heavily baited area. Furthermore, the club that was baiting afforded some sanctuary through most of the waterfowl season. Reportedly, the specific cove area that was baited was not hunted until the last few days of the season.

In 1959 the highest diving duck use occurred on Area #14, the large sound area south of Knotts Island. In 1960 that area was second in use after Area #17, the Currituck Sanctuary. Area #4, the Back Bay National Wildlife Refuge, was third in diving duck use in 1959 and fifth in 1960. Although Area #7 had average disturbance in both years, absolute disturbance was slightly less in 1960 and diving duck use increased.

Area #13, the 11,150-acre unit in the North Landing River, is adjacent to the 9,950-acre Area #14 which had high diving duck use. Food conditions were poor on Area #13 but at times disturbance forced the diving ducks from Area #14 to Area #13.

Diving duck use of most areas appeared to be influenced to a greater extent by the density and pattern of disturbance than was dabbling duck use.

Rank of Waterfowl Areas with Highest and Lowest Densities of Duck Use

Rank	Waterfowl Area Numbers					
	1958	1959	1960	1961	1962	1963
1	<b>10</b>	4	10	2	10	<b>17</b>
2	18	18	4	4	4	14
<b>3</b>	16	10	18	10	6	18
<b>4</b>	9	7	17	14	14	7
5	4	<b>16</b>	9	18	7	14
<b>16</b>	15	3	13	5	20	13
17	17	15	8	1	13	5
18	5	20	12	12	5	8
19	20	5	5	8	1	12
20	8	8	20	20	8	6

Locations and physical descriptions of each of the waterfowl areas are presented in later discussion. In general, areas with the lowest duck densities had virtually no submerged aquatics, and those with the highest duck densities were among the better vegetated areas.

Area 17 was among the worst of all 20 areas in 1958, the year that Currituck Sanctuary was **established in** that area. By 1960 it was among the five areas with highest duck densities, and in 1963 it had the highest density.

Though I have assigned good food ratings to several diving duck areas, it should be considered that these ratings were relative to food conditions on other subdivisions. Aquatic plant survival, and tuber and seed production **were not** ideal on most areas assigned good ratings.

I believe, within the limits of diving duck supply in the flyway, the primary factor limiting diving duck use of several of the aforementioned good feeding areas was disturbance. The tables and graphs show diving duck use in the pre-hunting, hunting, and post-hunting season was frequently highest in the post-hunting period on Areas #3, #6, #9, #10, and #16. These are the same areas with good food, high disturbance and below average diving duck use during the hunting season. This differs, in most instances, from the diving duck use pattern on Areas #14, #17, and #18, which provided some natural or established sanctuary. On these three areas use was highest during the hunting season but sharply reduced after the season. This further demonstrates the low tolerance that diving ducks have to disturbance.

Except for Area #10 in 1960, no other area sustained above average Canada geese use when there was above average disturbance. I observed heavy baiting of Area #10 that year which probably increased Canada goose use.

The only other areas with above average Canada geese use in either year during the hunting season were Areas #4, #14, #17, and #19, which include the refuge, the sanctuary, and two areas where disturbance was below average.

Table . Average Number of Occupied **Blinds** and Active or Exposed Boats on Each of Twenty Subdivisions of Back Bay, Virginia, and Currituck Sound, North Carolina, During the Waterfowl **Hunting Season** and the Density of Disturbance Per Acre.

Area*	Acres	Av. No.		Av. No.		Av. No.		Av. No. Occ.		Av. No.		Av. No.**	
		Ccc.	Blinds	Boats	Boats & Blinds	Blinds/Acre	Boats/Acre	Disturbance Factors/Acre	1959	1960			
		19 59	1960	19 59	1960	1959	1960	1959	1960	1959	1960	1959	1960
<b>1</b>	1,120	0.80	0.43	0.75	0.00	1.55	0.43	.0007	.0004	.0007	.0000	.0014	.0004
2	1,380	2.20	1.14	0.50	0.86	2.70	2.00	.0016	.0008	.0004	.0006	.0020	.0014
	1,620	8.00	4.57	1.00	1.00	9.00	5.57	.0049	.0028	.0006	.0006	.0055	.0034
2	8,000	0.00	0.00	0.87	1.71	0.87	1.71	.0000	.0000	.0001	.0002	.0001	.0002
5	8,500	12.41	10.43	2.25	3.00	14.65	13.43	.0015	.0012	.0003	.0004	.0018	.0016
6	6,040	15.00	8.00	0.87	2.14	15.87	10.14	.0025	.0013	.0001	.0004	.0026	.0017
7	4,390	3.80	2.14	1.37	1.71	5.17	3.85	.0009	.0005	.0003	.0004	.0012	.0009
<b>8</b>	<b>5,380</b>	3.40	0.14	3.13	0.86	6	51.03	.0013	.00070	.0006	.0002	.0012	.0002
Back Bay	36,430	45.60	26.86	10.75	11.29	56.35	38.15			.0003	.0003	.0016	.0010
9	3,660	9.00	7.33	1.37	2.43	10.37	9.76	.0029	.0024	.0004	.0008	.0033	.0032
<b>10</b>	4,350	12.00	9.17	1.50	2.57	13.50	11.74	.0028	.0021	.0003	.0006	.0031	.0027
11	4,800	2.80	0.83	0.87	0.14	3.67	0.97	.0006	.0002	.0002	.0000	.0008	.0002
12	3,150	0.60	0.67	0.87	0.29	1.47	0.96	.0002	.0002	.0003	.0001	.0005	.0003
13	11,150	0.60	0.00	1.75	1.57	2.35	1.57	.0001	.0000	.0002	.0001	.0003	.0001
14	9,950	2.60	<b>0.83</b>	1.13	1.14	3.73	1.97	.0003	.0001	.0001	.0001	.0004	.0002
15	6,070	2.00	2.17	1.50	2.71	3.50	4.88	.0003	.0004	.0002	.0004	.0005	.0008
16	10,490	22.20	9.83	6.37	4.14	28.57	13.93	.0021	.0009	.0006	.0004	.0027	.0013
17	11,730	4.20	5.00	8.63	4.29	4.83	9.29	.0004	.0004	.0001	.0004	.0005	.0008
18	17,950	28.20	17.00	9.25	8.57	37.45	25.57	.0016	.0009	.0005	.0005	.0021	.0014
19	8,520	2.80	1.50	2.00	3.43	4.80	4.93	.0003	.0002	.0002	.0004	.0005	.0006
<b>20</b>	18,060	1.80	1.67	1.00	1.86	2.80	3.53	.0001	.0001	.0001	.0001	.0002	.0002
Currituck	109,280	89.00	55.83	28.25	33.14	117.25	88.97	.0008	.0005	.0003	.0003	.0011	.0008
Total Area	145,710	134.60	82.69	39.00	44.44	173.60	127.10	.0009	.0006	.0003	.0003	.0012	.0009

\* Area locations defined in Waterfowl Utilization Tables.

\*\* Occupied blinds and active or exposed boats are here- considered as additive for-total disturbance factor.

Table . Relative Percentage of Disturbance Each Area Received in Relation to the Entire Area During the Hunting Seasons of 1959-60 and 1960-61.

Area*	Relative Percentage of Density to the Total Area					
	Hunting		Boating		Total*	
	1959	1960	1959	1960	1959	1960
1	2.87	2.68	11.11	0.00	4.56	1.86
2	6.56	5.37	6.35	8.96	6.51	6.48
3	20.08	1a.79	9.52	8.96	17.92	15.74
4	0.00	0.00	1.59	2.99	0.33	0.93
5	6.15	8.05	4.76	5.97	5.86	7.41
6	10.25	8.72	1.59	5.97	8.47	7.87
7	3.69	3.36	4.76	5.97	3.91	8.80
8	2.46	0.00	9.52	2.99	3.91	0.93
<b>Back Bay</b>	<u>61.90</u>	<u>58.33</u>	<u>50.00</u>	<u>50.00</u>	<u>59.26</u>	<u>55.56</u>
9	11.89	16.11	6.35	11.94	10.75	14.81
10	11.48	14.09	4.76	8.96	10.10	12.50
11	<b>2.46</b>	1.34	3.17	0.00	2.61	0.93
12	0.82	1.34	4.76	1.49	1.63	1.39
13	0.41	0.00	3.17	1.49	0.98	0.46
14	1.23	0.67	1.59	1.49	1.30	0.93
15	1.23	2.68	3.17	5.97	1.63	3.70
16	8.61	6.04	9.52	5.97	8.79	6.02
17	1.64	2.68	1.59	5.97	1.63	3.70
<b>18</b>	6.56	6.04	7.94	7.46	6.84	6.48
19	1.23	1.34	3.17	5.97	1.63	2.78
20	0.41	0.67	1.59	1.49	0.65	0.93
<b>Currituck Sound</b>	<u>39.10</u>	<u>41.67</u>	<u>50.00</u>	<u>50.00</u>	<u>40.74</u>	<u>44.44</u>
Total Area	100%	100%	100%	100%	100%	100%

\* Area locations defined in Waterfowl Utilization Tables.

\*\* Occupied blinds and active or exposed boats are here considered as additive for total disturbance factor.

Table \_\_\_\_\_ Location of Waterfowl Areas of Back Bay and Currituck Sound  
 Shown in the Graphs Comparing Waterfowl Density, Disturbance  
 Factors, and Food Conditions; General Food Conditions Rated  
 by Waterfowl Group on Abundance and Availability.

	<u>Location</u>	<u>Food Conditions</u>		
		<u>Dabblers</u>	<u>Divers</u>	<u>Geese</u>
1.	Sand Bridge Marsh	Good	Fair	Good
2.	North Bay	Poor	Fair	Fair
3.	Shipps Bay	Poor	Good	Good
4.	Back Bay N. W. R.	Good	Good	Good
5.	Back Bay Proper	Poor	Poor	Poor
6.	Sand Bay	Fair	Good	Good
7.	Buzzard's Bay and North Great Marsh	Good	Good	Good
8.	Upper North Landing River	Fair	Poor	Poor
9.	Knotts Island Marsh and Channel	Good	Good	Good
10.	Knotts Island Bay	Good	Good	Good
11.	Mackay Island Marsh	Good	Poor	Poor
12.	<b>Tulls</b> Bay	Fair	Poor	Poor
13.	Lower North Landing River	Poor	Poor	Poor
14.	Open Sound Knotts Island to <b>Churchs</b> Island	Poor	Good	Fair
15.	<b>Coinjock</b> Bay Area	Fair	Poor	Poor
16.	Swan Island to Currituck Lighthouse	Good	Good	Good
17.	Currituck Sanctuary; Poplar Branch-Church Island	Poor	Fair	Pair
18.	Currituck Lighthouse through Mossey Island	Good	Good	Good
19.	Dews Quarter <b>Istland</b> to Poplar Branch	Poor	Fair	Fair
20.	South End Currituck Sound	Poor	Poor	Poor

Figure

Comparison of Dabbling Duck Density to Disturbance Factors, as Defined by Occupied Blinds and Exposed Boats, on Twenty Subdivisions of Back Bay, Virginia, and Currituck Sound, North Carolina, in the Winter of 1959-60; with Dabbling Duck Food Conditions indicated by Symbols.

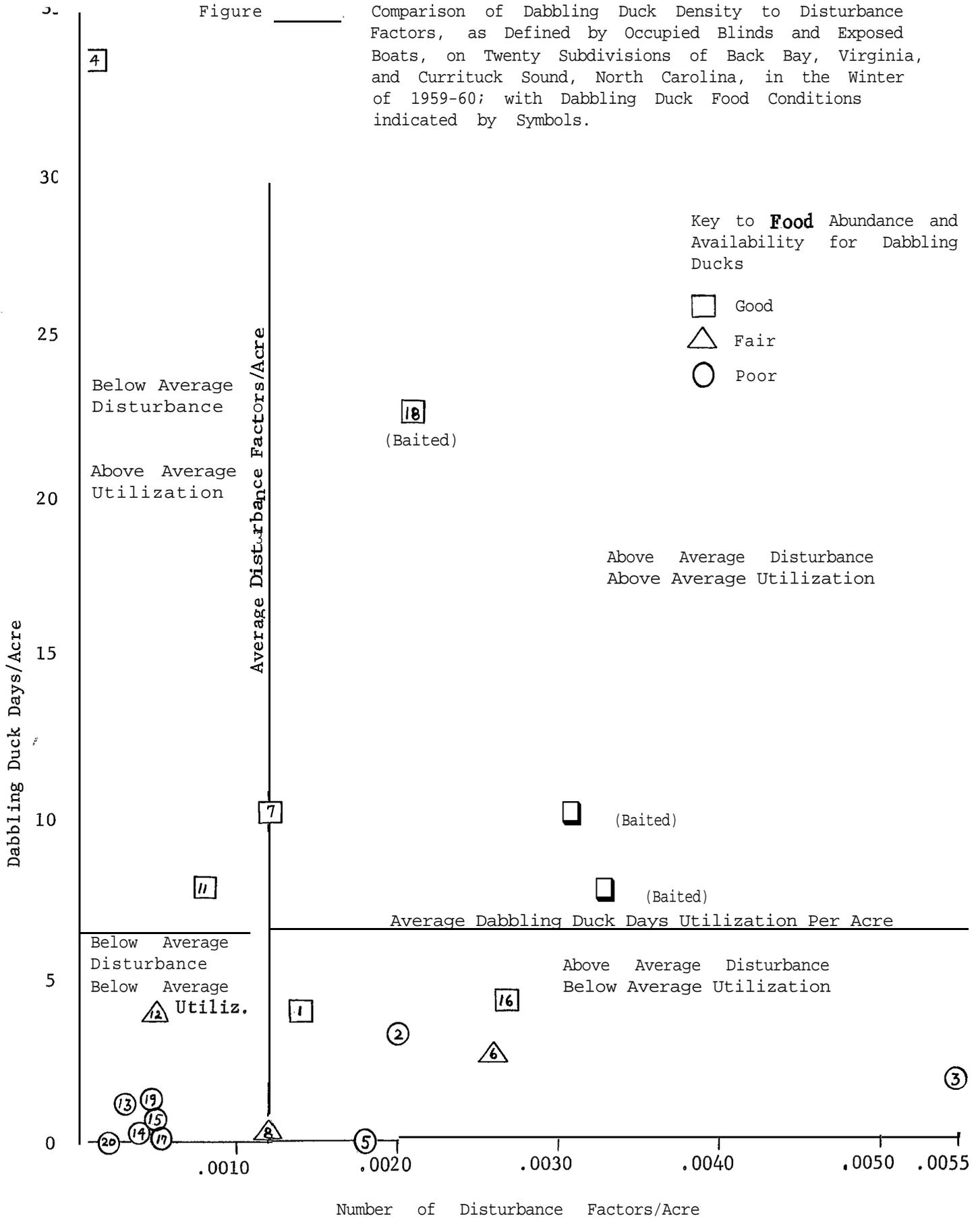


Figure \_\_\_\_\_, Comparison of **Diving Duck** Density to Disturbance Factors, as Defined by Occupied Blinds and Exposed Boats, on Twenty Subdivisions of Back Bay, Virginia, and Currituck Sound, North Carolina, in the Winter of 1959-60; with Diving Duck Food Conditions Indicated by Symbols.

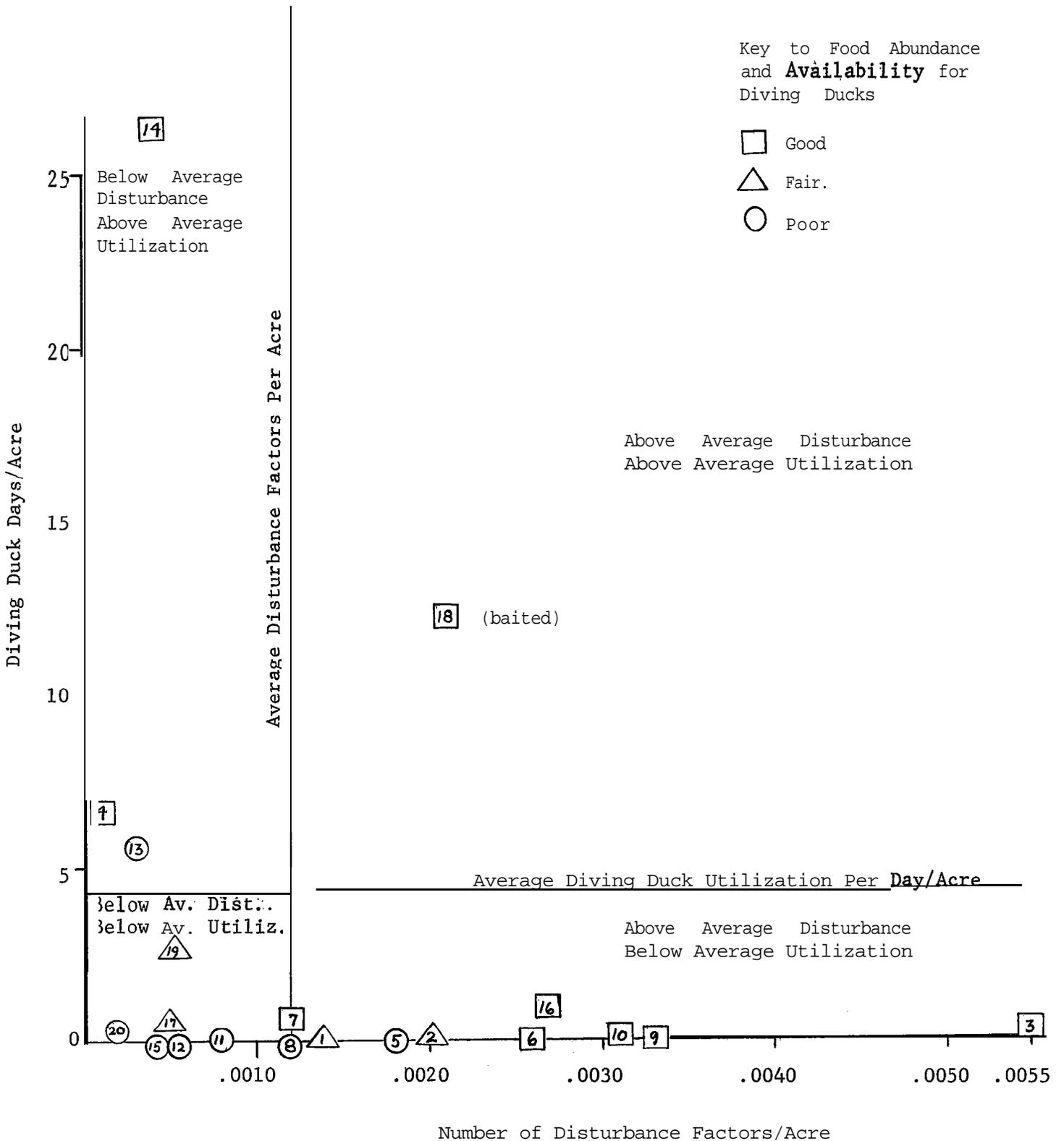


Figure \_\_\_\_\_ Comparison of Canada Geese Density to Disturbance Factors, as Defined by Occupied Blinds and Exposed Boats, on Twenty Subdivisions of Back Bay, Virginia, and Currituck Sound, North Carolina, in the Winter of 1959-60; with Canada Geese Food Conditions Indicated by Symbols.

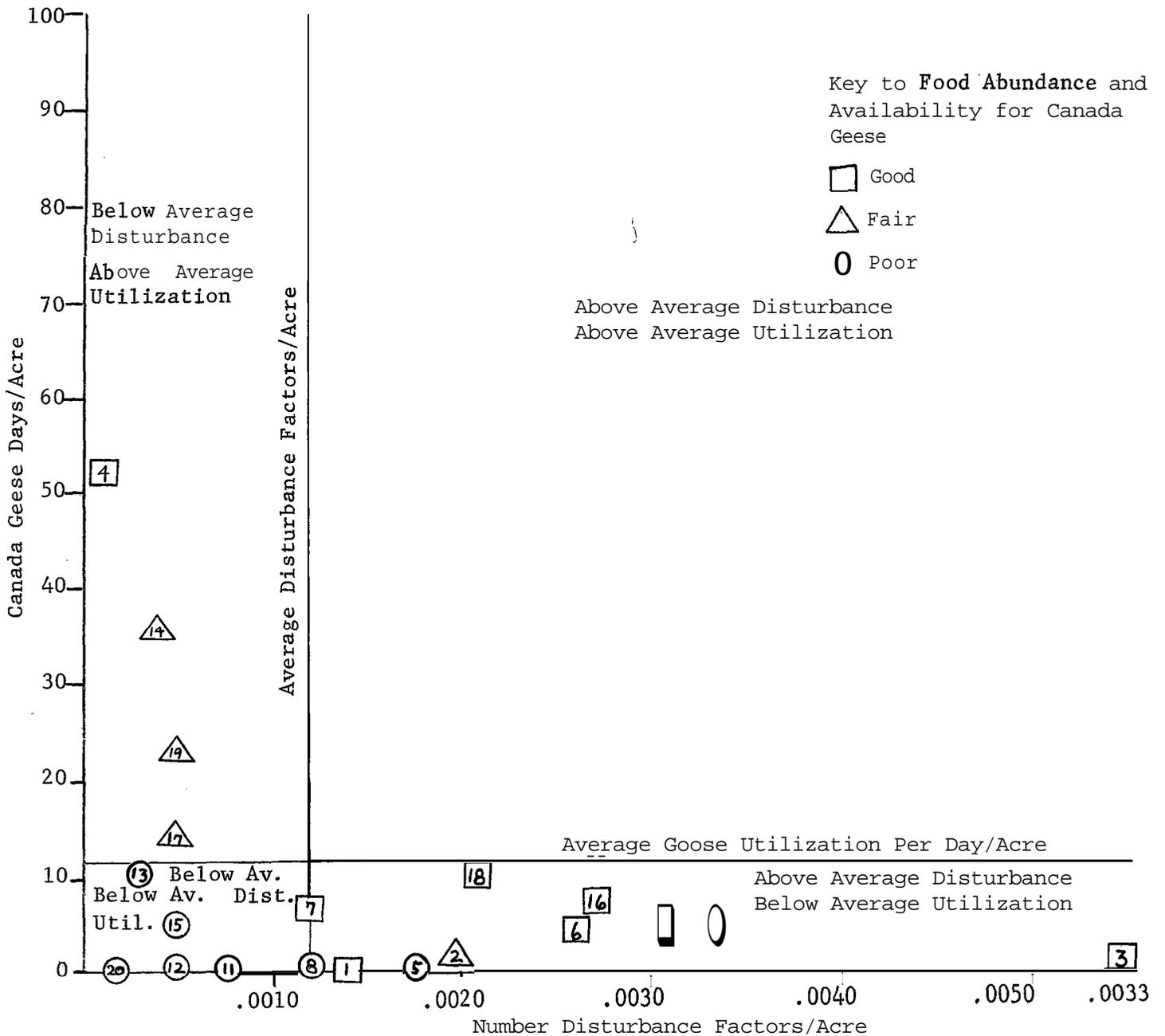


Figure \_\_\_\_\_ Comparison of Dabbling Duck Density to Disturbance Factors, as Defined by Occupied Blinds and Exposed Boats, on Twenty Subdivisions of Back Bay, Virginia, and Currituck Sound, North Carolina in the Winter of 1960-61; with Dabbling Duck Food Conditions Indicated by Symbols.

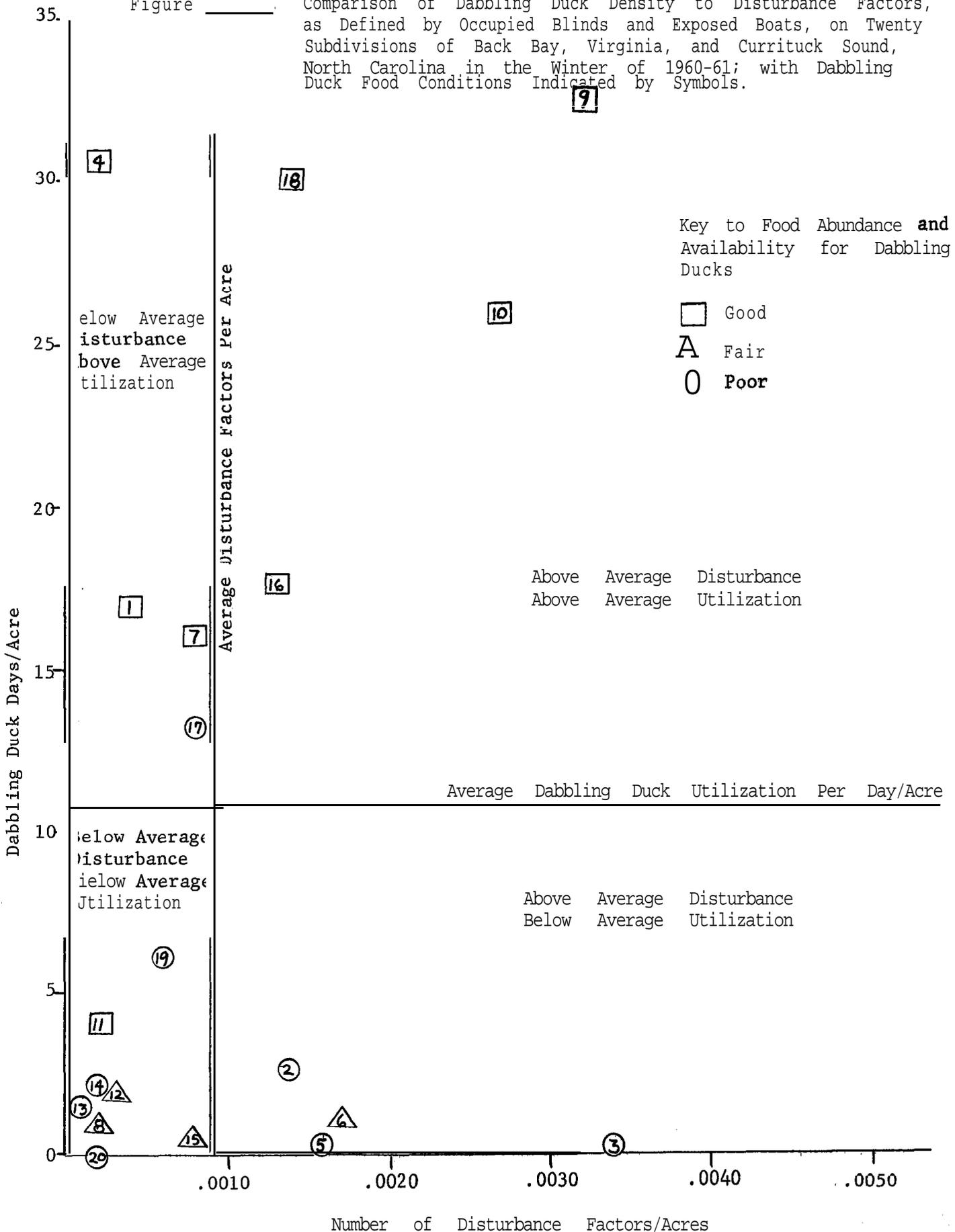
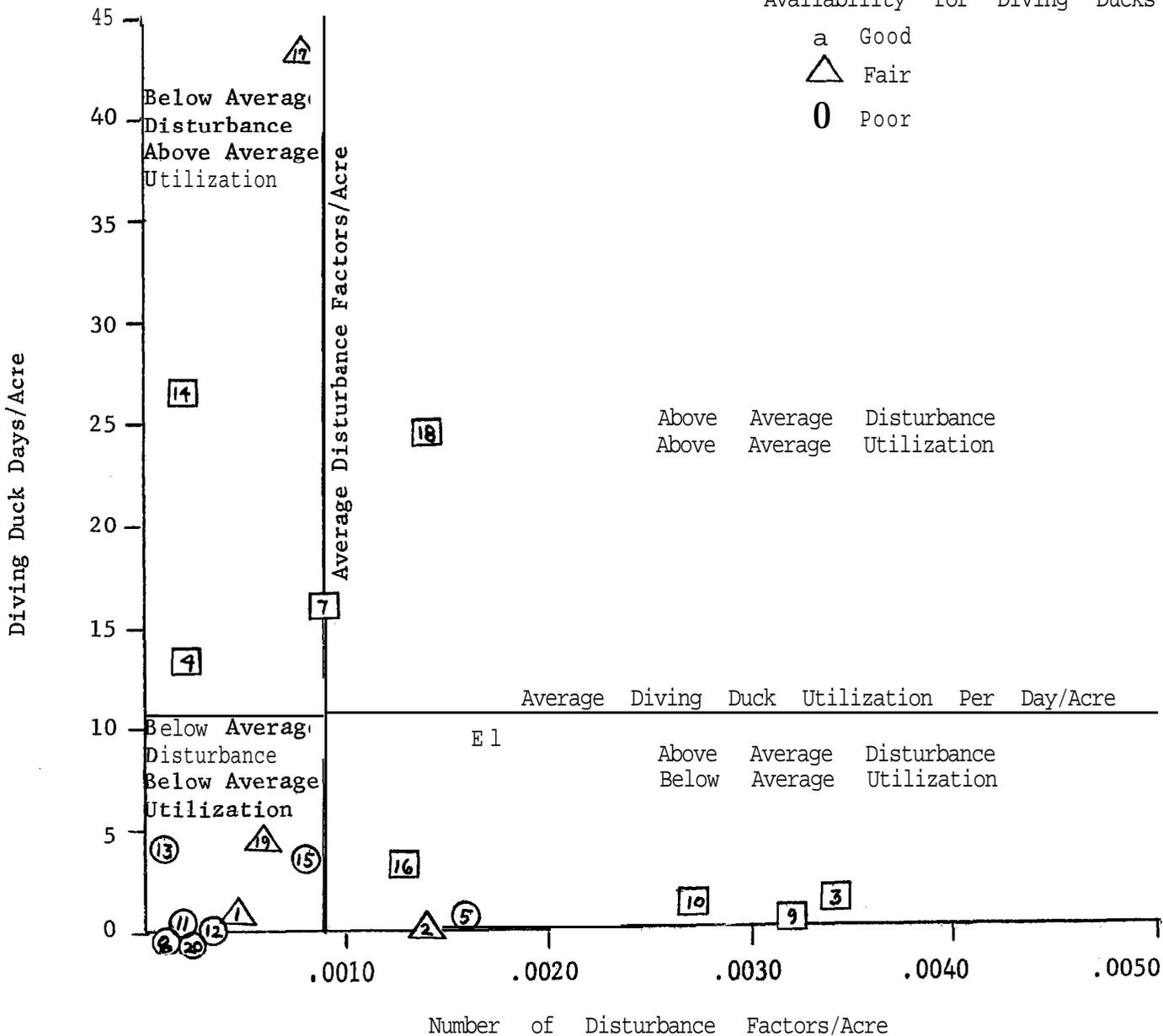


Figure \_\_\_\_\_

**Comparison** of Diving Duck Density to Disturbance Factors, as Defined by Occupied Blinds and Exposed Boats, on Twenty Subdivisions of Back Bay, Virginia, and Currituck Sound, North **Carolina**, in the Winter of 1960-61; with Diving Duck Food Conditions Indicated by Symbols.

Key to Food Abundance and Availability for Diving Ducks

- a Good
- △ Fair
- 0 Poor



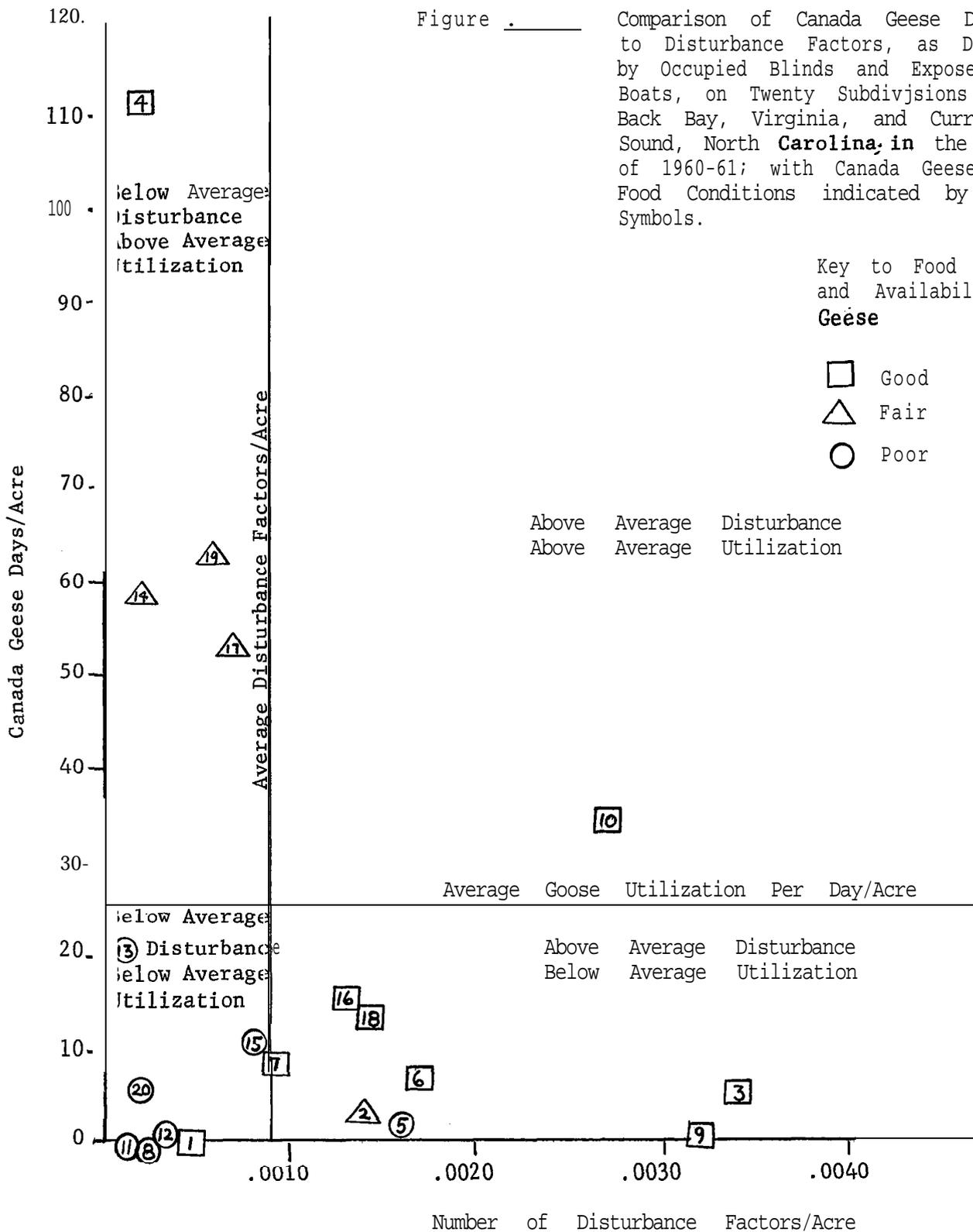


Figure \_\_\_\_\_ Theoretical Pattern of Waterfowl Utilization **Under** Conditions of Abundant or Scarce Food Supply and Hunting or Non-Hunting.

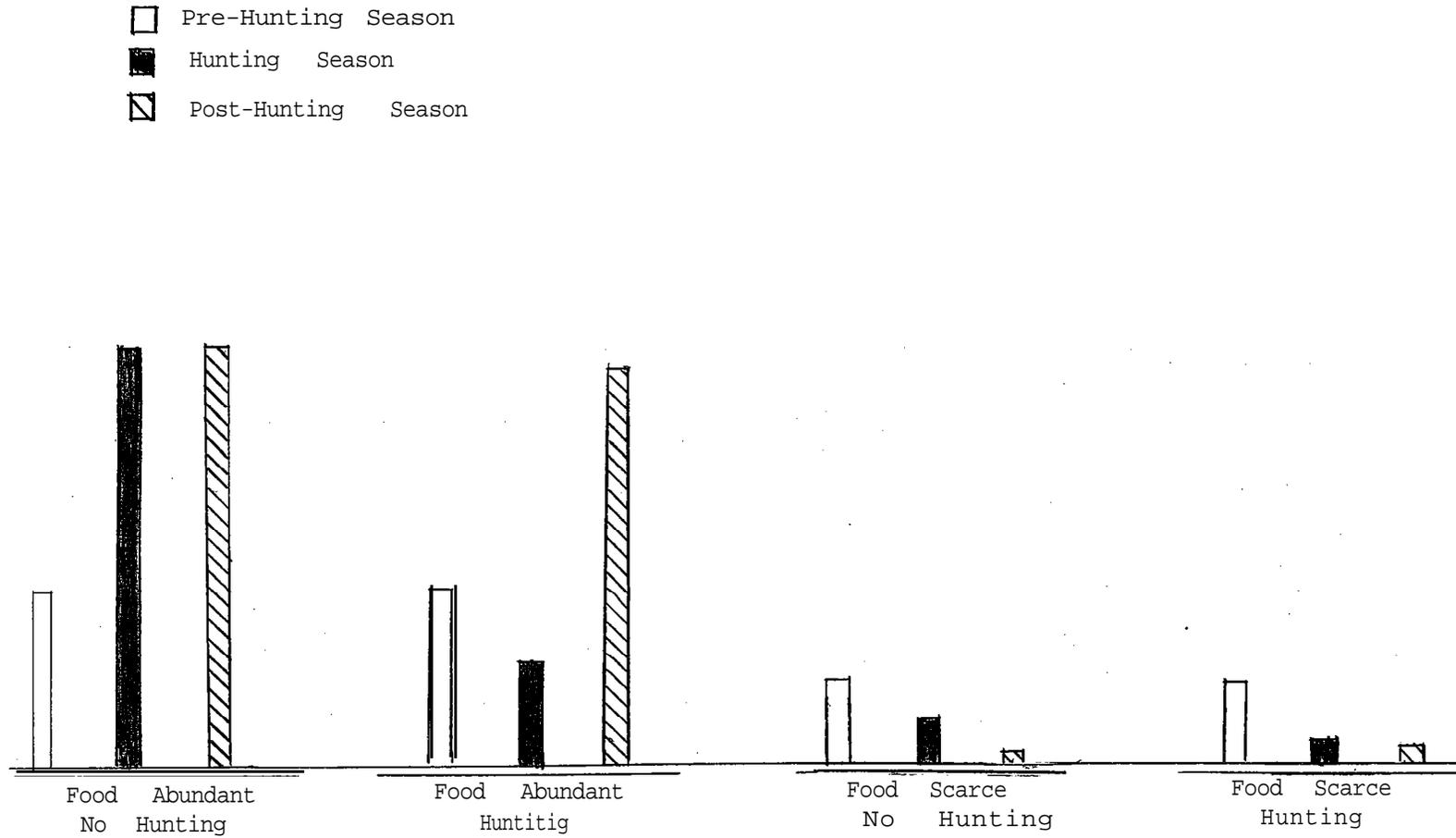


Figure \_\_\_\_\_ Dabbling Duck, Diving Duck, and Canada Geese Days of Utilization of Back Bay, Virginia, During the Pre-Hunting, Hunting, and Post-Hunting Seasons of 1958, 1959, and 1960.

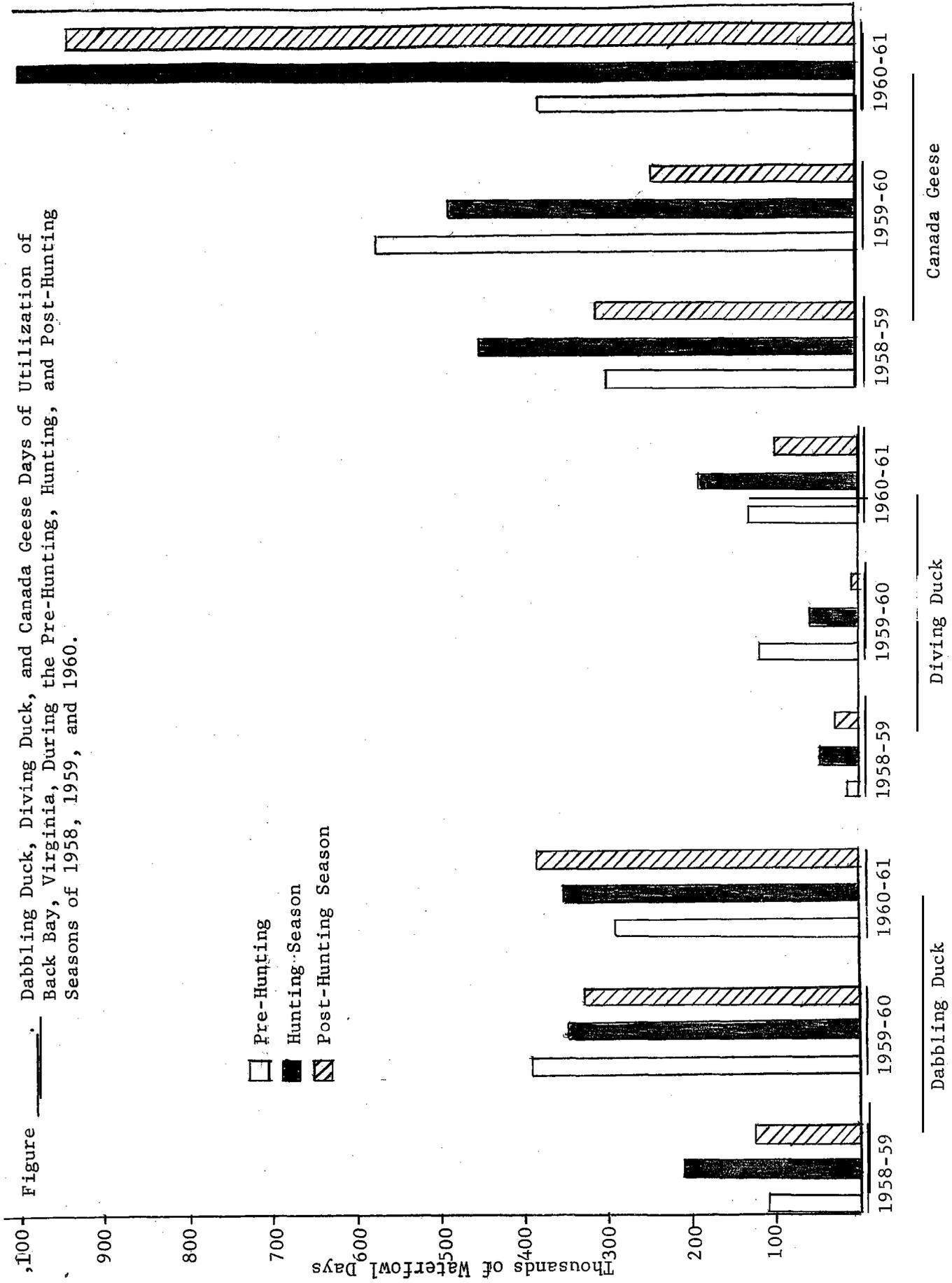
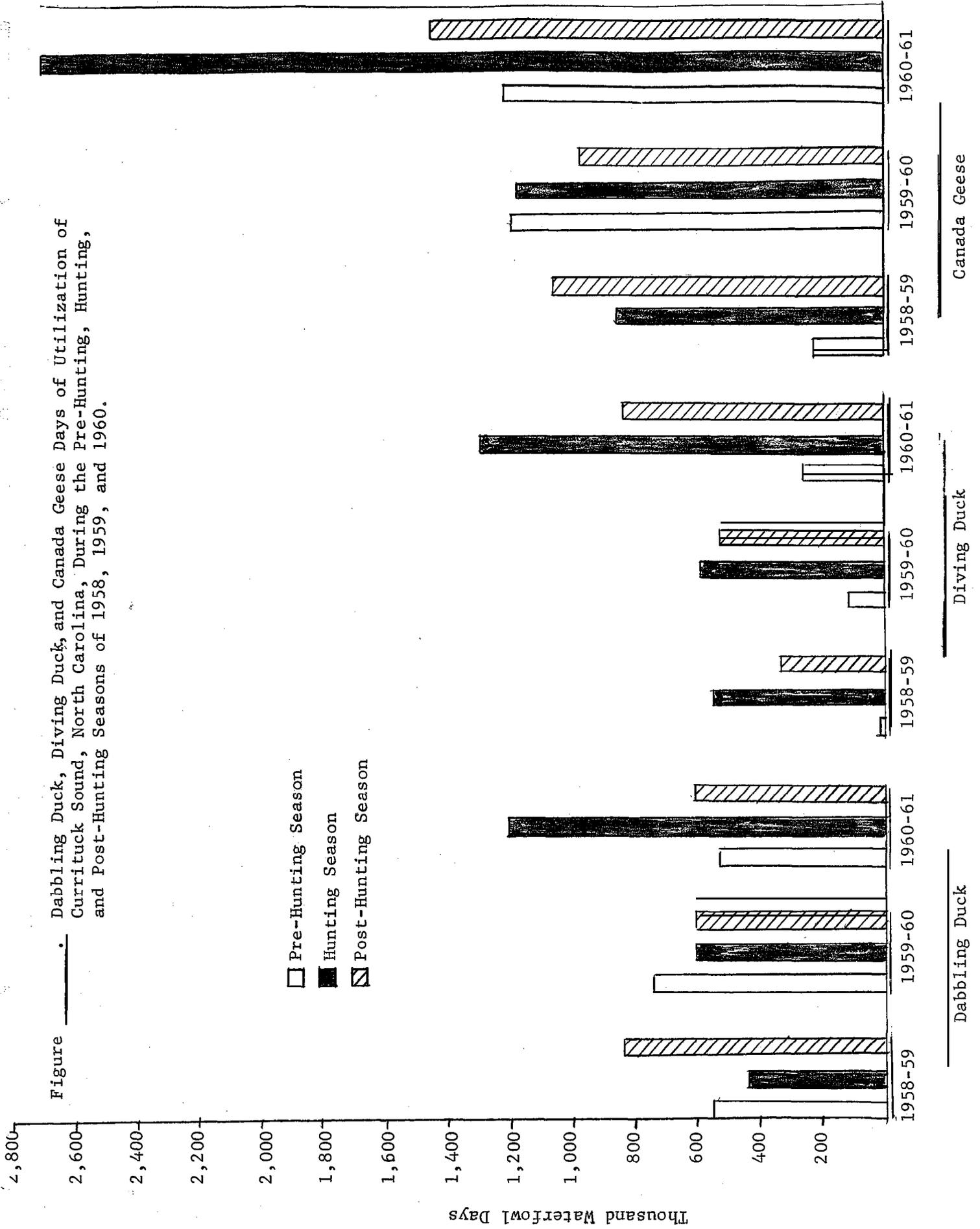


Figure \_\_\_\_\_ Dabbling Duck, Diving Duck, and Canada Geese Days of Utilization of Currituck Sound, North Carolina, During the Pre-Hunting, Hunting, and Post-Hunting Seasons of 1958, 1959, and 1960.



**Table \_\_\_\_\_ Waterfowl Day Utilization of Back Bay, Virginia and Currituck Sound, N. C. During Pre-Hunting, Hunting, and Post-Hunting Period, 1958-59 through 1960-61.**

Species	Area	1958-59			1959-60			1960-61		
		Pre-Hunt	Hunt	Post-Hunt	Pre-Hunt	Hunt	Post-Hunt	Pre-Hunt	Hunt	Post-Hunt
Dabbling Ducks	Back Bay	106,571	210,223	<b>123,308</b>	391,245	<b>343,435</b>	326,351	289,855	<b>352,783</b>	<b>384,331</b>
	Currituck	<b>543,581</b>	<b>438,864</b>	<b>839,888</b>	<b>741,248</b>	<b>603,438</b>	602,339	<b>525,828</b>	<b>1,206,425</b>	605,432
Diving Ducks	Back Bay	13,613	<b>46,707</b>	<b>26,870</b>	116,075	55,931	5,393	<b>128,544</b>	137,262	<b>98,475</b>
	Currituck	<u>7,613</u>	<u>546,288</u>	<u>329,935</u>	<u>105,322</u>	<u>587,547</u>	<u>519,109</u>	<u>254,302</u>	<u>1,349,824</u>	<u>834,255</u>
Total Ducks	Back Bay	<b>120,184</b>	256,930	150,173	507,320	399,366	331,744	<b>418,399</b>	<b>540,045</b>	<b>482,806</b>
	Currituck	551,194	985,152	<b>1,169,823</b>	846,570	1390,935	<b>1,121,998</b>	<b>780,130</b>	<b>2,556,249</b>	<b>1,439,687</b>
Canada Geese	Back Bay	296,744	<b>448,674</b>	<b>309,895</b>	569,915	484,703	<b>244,291</b>	377,975	<b>999,898</b>	<b>942,678</b>
	Currituck	224,693	<b>845,311</b>	<b>1,064,005</b>	<b>1,195,949</b>	<b>1169,422</b>	974,621	<b>1,211,783</b>	<b>2,703,327</b>	<b>1,448,136</b>
Coot	Back Bay	25,522	<b>79,982</b>	1,909	35,727	<b>26,588</b>	36	<b>97,744</b>	<b>302,044</b>	<b>224,198</b>
	Currituck	<b>186,889</b>	<b>1,195,661</b>	<b>1,031,819</b>	<b>333,098</b>	<b>842,439</b>	<b>1,471,620</b>	535,101	<b>2,273,870</b>	<b>1,648,113</b>
Goose	Back Bay	9,211	<b>390,812</b>	530,195	<b>44,300</b>	904,550	<b>1,553,075</b>		537,570	<b>1,121,795</b>
	Currituck			<b>1,049,000</b>	27,400	400,025	305,510	<b>55,100</b>	<b>535,966</b>	<b>1,807,234</b>
Swan	Back Bay	<b>823</b>	103,667	52,258	<b>181,851</b>	308,347	<b>112,694</b>	<b>46,168</b>	<b>341,789</b>	<b>294,490</b>
	Currituck	<b>11,009</b>	232,944	556,319	<b>145,052</b>	452,052	<b>733,815</b>	<b>230,840</b>	<b>605,830</b>	549,234
Waterfowl	Currituck	<b>887,434</b>	<b>1,553,203</b>	<b>1,045,426</b>	<b>1,339,113</b>	<b>2123,554</b>	<b>2,241,840</b>	<b>940,286</b>	<b>2,721,346</b>	<b>3,065,967</b>
				<b>4,874,346</b>	<b>2,488,569</b>	<b>4054,923</b>	<b>5,107,564</b>	<b>2,812,954</b>	<b>8,675,242</b>	<b>6,892,454</b>

Table. Comparison of the Waterfowl Days/Acre Utilization of Back Bay, Virginia and Currituck Sound, N. C. During Pre-Hunting, Hunting, and Post-Hunting Period 1958-59 through 1960-61.

Species	Area	1958-59			1959-60			1960-61		
		Pre-Hunt	Hunt	Post-Hunt	Pre-Hunt	Hunt	Post-Hunt	Pre-Hunt	Hunt	Post-Hunt
Dabbling Ducks	Back Bay	2.9	5.8	3.4	10.7	9.4	9.0	8.0	9.7	10.6
	Currituck	5.0	4.0	7.7	6.4	5.5	5.5	4.8	11.0	5.5
Diving Ducks	Back Bay	0.4	1.3	0.7	3.2	1.5	0.1	3.5	5.1	2.7
	Currituck	<u>0.1</u>	<u>5.0</u>	<u>3.0</u>	<u>1.0</u>	<u>5.4</u>	<u>4.8</u>	<u>2.3</u>	<u>12.4</u>	<u>7.6</u>
Total Ducks	Back Bay	3.3	7.1	4.1	13.9	10.9	9.1	11.5	14.8	13.3
	Currituck	5.0	9.0	10.7	7.8	9.9	10.3	7.1	23.4	13.2
Canada Geese	Back Bay	8.1	12.3	8.5	15.6	13.3	6.7	10.4	27.4	25.9
	Currituck	2.1	7.7	9.7	10.4	10.7	8.9	11.1	24.7	13.3
Coot	Back Bay	0.7	2.2	0.1	1.0	0.7		2.7	8.3	6.2
	Currituck	1.7	10.9	9.4	3.1	7.7	13.5	4.9	20.8	15.1
Snow Geese	Back Bay	0.3	17.9	14.6	1.2	24.3	42.6		14.8	30.8
	Currituck		3.6	9.6	0.3	3.7	7.4	0.5	4.9	16.5
Swan	Back Bay		3.0	1.4	5.0	8.5	3.1	1.3	9.4	8.1
	Currituck	<u>0.1</u>	<u>2.1</u>	<u>5.1</u>	<u>1.3</u>	<u>4.1</u>	<u>6.7</u>	<u>2.1</u>	<u>5.5</u>	<u>5.0</u>
Total Waterfowl	Back Bay	12.4	42.6	28.7	36.5	58.3	61.5	25.8	74.7	64.2
	Currituck	9.1	33.6	44.5	22.2	37.1	46.7	25.7	79.3	63.1

It should be noted that Areas #14, #17, and #19 were assigned only fair food ratings for Canada geese. After the hunting season the density of use generally decreased. However, Areas #3, #6, #9, #16, and #18 which had good food ratings, above average disturbance, and below average Canada geese use during the hunting season, frequently experienced higher use after the hunting season.

Again, this demonstrates good feeding areas were avoided because of disturbance, The distribution of Canada geese on the Back Bay-Currituck Sound Area is definitely affected by disturbance factors.

All areas rated as poor feeding areas for Canada geese had below average use, and most of these areas had below average disturbance. A slight exception was the lower North Landing River, Area #13, which had poor natural food for Canada geese, below average disturbance, but about average use. However, it was in close juxtaposition to Areas #14 and #17, which were high-use areas, and also it was close to cropland.

The areas assigned poor food ratings for Canada geese were those same **deep**, silt-laden areas where it is unlikely that much improvement could result from intensive management efforts. Also, disturbance was below average on those areas and further reduction in disturbance is not likely to cause increased use. Better distribution of Canada geese during the hunting season would result from reduction of disturbance on Areas #2, #3, #6, #7, #9, #10, #16, or #18.

Possibly Canada geese in this area have certain behavioral limits beyond which they will not tolerate certain flock sizes or densities. If density limitations exist, then the entire area could be limiting to Canada geese use because only four or five areas are of value; other areas either had no food or disturbance was excessive. Additional sanctuaries in any of the areas of good food conditions would probably result in higher Canada geese use on that area, and quite possibly higher Canada geese use of the entire area.

#### Summary of Relationships of Waterfowl Use, Disturbance and Food Conditions

The relationship of waterfowl use to food conditions and disturbance factors present a **basic** continuum that is further complicated by waterfowl supply, waterfowl behavior, juxtaposition to other areas, and the relative relationship of all these factors on each area. In discussion of these relationships I have purposefully avoided reference to absolute values of waterfowl densities and disturbance factors for they only pertain to this one situation in these 2 years. I believe the values for densities and disturbance are accurate and the ratings of food conditions were reasonably assigned.

The principal factor limiting use of the entire area of Back Bay and Currituck Sound during the past 17 years by diving ducks, Canada geese, and greater snow geese was the total supply of these waterfowl in the Atlantic Flyway. Disturbance was also considered to be of importance in limiting use by diving ducks and Canada geese on individual portions of the area and possibly on the entire area.

Although the food supply was not shown to be limiting for diving ducks and Canada geese on the entire area; it apparently was of importance in limiting use on Back Bay.

It is presumed that if total supply of diving ducks and Canada geese was limiting for the past 17 years, this would have been of equal, or greater, importance in earlier years.

Use of the entire area by dabbling ducks and coots apparently was about equally affected by food conditions, disturbance, and total supply of these birds in the Atlantic Flyway; no one factor being obviously of greatest importance. Much of the supply of marsh foods was not available to dabbling ducks because of the dense vegetation. This is a factor relatively unchanged from former years and therefore not a cause of lower carrying capacity. The tendency of the submerged aquatic foods to sink in late fall, in much of the study area, might limit their availability to dabbling ducks and coots to a greater degree than indicated by the estimates of total supply. The potential for management for dabbling ducks by increasing food supply and availability in the marshes is particularly good over much of the area, and would yield the greatest results in waterfowl management.

Although food supply and disturbance to waterfowl have primarily relevance to subdivisions of the entire area, it should be remembered that these subdivisions are of prime importance to the individual waterfowl hunter.

The relative influence of total waterfowl **supply, food** abundance, and disturbance fluctuates **continually** and generalization about these factors is most difficult.

Reduction in disturbance or increase in the waterfowl food supply on some of the 20 subdivisions would probably result in local increases in waterfowl use. Certain areas would require both to achieve increased waterfowl use. Increased use of the area, naturally, implies decreased use of other areas.

Management of many potentially good marshes seems to be more critical than the disturbance factor for dabbling ducks. Disturbance is possibly of greater importance in limiting Canada geese and diving duck use than it is in limiting dabbling duck use.

Strategically located sanctuaries on areas of good food supply and availability for Canada geese and diving ducks would result in better distribution of the supply and contribute to more equitable harvest throughout the area.

#### Description of Waterfowl Areas of Back Bay and Currituck Sound

The waterfowl areas or subdivisions of Back Bay and Currituck Sound were selected principally on a geographic basis, but consideration was given to recognizable land features and certain specific land uses, e.g., the Back Bay National Wildlife Refuge, the Currituck Sound Sanctuary, and certain patterns of hunting distribution. Although the original selection of waterfowl areas could be improved now for more direct comparison to other surveys, it was satisfactory.

A brief description of each waterfowl area follows:

Waterfowl Area No. 1 - Sandbridge Marshes and Ponds. Approximately 1,120 acres of cattail, big cordgrass, bulrush, smartweed, marshmallow marsh, with 105 acres of open shallow ponds. Sandbridge Marsh was on the northern end of the study area above North Bay. Average water depth was about 2.5 feet. Bottom soils were mostly loam. Bushy pondweed and wildcelery occurred in fair abundance in some years.

Waterfowl Area No. 2 - North Bay and Horne Point. Approximately 1,380 acres consisting of open water of North Bay which averaged about 4 feet in depth, and the marshes and shallow ponds of Horne Point which accounted for about one-fourth of the acreage. The marsh was a heterogeneous mixture of cattails, common rush, plume grass, common spikerush, saltmeadow cordgrass, bulrushes, saltgrass, marshmallow, needlerush, etc. Sweetgale was common on the beach side. Wildcelery, bushy pondweed, Chara sp., and redheadgrass were often abundant.

Waterfowl Area No. 3 - Shipps Bay. An open water area of about 1,630 acres with insignificant cattail, big cordgrass, needlerush, and marshmallow marsh. It was located just south of North Bay and just north of the Back Bay National Wildlife Refuge.

**Sandy soils** were common on the eastern side and loam and muck soils occurred on the western side. Wildcelery, bushy pondweed, widgeongrass, sago pondweed, and muskgrasses were normally among the more common aquatics. Water depth ranged from 2 feet on the eastern side to about 5.5 feet on the western side. The average depth was 4.3 feet.

Waterfowl Area No. 4 - Back Bay National Wildlife Refuge. There were approximately 8,000 acres that were considered as waterfowl habitat. This area contained one of the larger marsh-pond areas in the entire area. Shallow water marsh-ponds, open sounds, man-made beach ponds and impoundments, and goose pasture fields made this the most diverse habitat unit. The heterogeneous marshes were composed of cattails, common rush, needlerush, three-squares, big cordgrass, saltgrass, common spikerush, sedges, rose mallow, saltmarsh mallow. The marsh ponds and small embayments were frequently filled with bushy pondweed, wildcelery, and redheadgrass. The larger bays supported a mixture of all common submerged aquatics with sago pondweed, wildcelery, redheadgrass, and widgeongrass among the dominant plants. The average water depth of the area was 3.8 feet. Sand, silt, and loam soils predominate. Clay, peat, muck, and scattered oystershell were less common.

Waterfowl Area No. 5 - Back Bay "Proper.!" This 8,500-acre unit was the large bay south of the Back Bay National Wildlife Refuge and west of Ragged Island. This was the deepest bay in the Virginia portion of the total area and averaged about 5.6 feet in depth. The bottom soils were a thick layer of silt loam covered with 1 to 4 inches of fine semiliquid silt. Vegetation, in recent years, was normally lacking in most portions of this area. An occasional stand of sago pondweed occurred near the periphery of the area, and elsewhere there were scattered plants of bushy pondweed or muskgrass. Wave action and turbidity were severe in this area and waterfowl used it primarily for resting.

The marshes on the west of this area were a mixture of cattails, common rush, needlerush, three-squares, big cordgrass, sedges, smartweeds, etc.

Waterfowl Area No. 6 - Sand Bay. Lies south of Buck Island Bay, (which is in the Back Bay National Wildlife Refuge) east of Ragged Island and Cedar Island and north of Area No. 9, the Knotts Island Marshes. The average water depth of this **6,040-acre** unit was 3.5 feet. Bottom soils were predominantly sand or sandy loam. Wildcelery, muskgrasses, bushy pondweed, redheadgrass, and sago pondweed were among the more common aquatics. Cattails, needlerush, three-squares, etc., were common in the narrow eastern marsh that borders the area.

Waterfowl Area No. 7 - Buzzard's Bay, Pocahontas Marsh, and the Great Marsh.

This area included approximately 4,390 acres of shallow bays and marsh. It was bordered on the north by Back Bay, on the east by Knott's Island, on the south by the Knott's Island Causeway, and on the west by the mainland. Average depth of the water was about 3.2 feet. Here, more than any other area, the marsh itself was of importance to waterfowl. Extensive snow goose use was an important factor in opening up the marsh for use by other duck species.

Both the Mackay Island National Wildlife Refuge and the Pocahontas State Waterfowl Management Area were established in portions of this area in the early 1960's.

Although the southern portion of this area was actually in North Carolina, all waterfowl counts for No. 7 were listed in Virginia totals. For all aspects of the study, the causeway was considered the State line.

Bushy pondweed, redheadgrass, wildcelery, muskgrasses, widgeongrass, dwarf spikerush, and arrowhead were common submerged aquatics.

Cattails, common spikerush, marshmallow, and big cordgrass were common marsh plants.

Waterfowl Area No. 8 - The Upper North Landing River. This area between the Creeds River Bridge and Faraby Island near the State line was the last area included in the Virginia totals and it consisted of approximately 5,380 acres of river and marsh. Cattails, needlerush, three-squares, big cordgrass were the dominant marsh vegetation. The river was turbid and averaged about 7 feet in depth. Aquatics were very scarce in this area. Silt overlaying muck and clay soils was the predominant soil type.

Currituck Sound was subdivided into waterfowl areas No. 9 through No. 20.

Waterfowl Area No. 9 - The Knotts Island Marsh included 3,060 acres of innumerable shallow ponds, coves, and marsh areas on the eastern side of Knott's Island. It was bounded on the north by Area No. 6 (Sand Bay), on the east by the outer banks, and on the south by Knott's Island Bay. Part of the area was in Virginia, but most of it was in North Carolina. The average water depth was 2.9 feet and most aquatics were abundant. The marsh contained three-square, cattail, needlerush, common spikerush, smartweeds, pickerelweed, American germander, etc.

Waterfowl Area No. 10 - Knott's Island Bay included 4,350 acres of bay, marsh, and beach ponds. The major part of the area consisted of a shallow, open bay on the west, with marsh ponds to the south and beach ponds to the east. The average water depth of the bay was 2.9 feet. This area was frequently heavily vegetated with wildcelery, redheadgrass, bushy pondweed, widgeongrass, and sago pondweed. The area was bounded by Areas 9, 14 and 16; and the southern edge extended along a line from Knott's Island to Swan Island. Sand and muck soils were common. The marsh vegetation just north of Swan Island was predominantly cattail, needlerush, common spikerush, and three-square. Sweetgale was common on the beach marshes.

Waterfowl Area No. 11 - Great Marsh and Mackay Island Marsh included 4,800 acres of marsh and ponds south of the Knott's Island Causeway. The ponds on the south end of Mackay Island were included in this area. In the early 1960's the area to the east of Cory's ditch was acquired as part of the Mackay Island National Wildlife Refuge. Several ponds were nonvegetated. Wildcelery, redheadgrass, muskgrasses, bushy pondweed, dwarf spikerush, and watermilfoil occurred in some ponds.

Needlerush, cattails, big cordgrass, saltmeadow grass, three-squares, marshmallow, squarestem, spikerush, common spikerush, sedges, pickerelweed, etc., were abundant.

Waterfowl Area No. 12 - Tulls Bay and the adjoining marsh included about 3,150 acres to the west of the North Landing River. The average water depth was 5 feet. The water was darkly stained. The bay had a sparse quantity of Chara sp., wildcelery, bushy pondweed, Sagittaria subulata, Nitella sp., and widgeongrass. The marsh vegetation was primarily cattail, three-square, needlerush, and big cordgrass.

Waterfowl Area No. 13 - The Lower North Landing River included a large open water area of 11,150 acres extending from Faraby Island to Bells Island that was bounded on the east by a line drawn between the tip of Bells Island and Mackay Island. The average depth of water was 6.8 feet; the water was normally turbid. Loam-silt bottoms were predominant in the deeper waters. Some of the shallow edges had sand bottoms. Aquatic plant production was confined to small quantities of wildcelery, redheadgrass, bushy pondweed, and Chara sp. in the shoal areas. No marsh of any significance was included in the area.

Waterfowl Area No. 14 - Open water area south of Knott's Island included 9,950 acres bounded by Areas 13 on the west, 16 and 17 on the south, 16 on the east, and 10 and 11 on the north. A perimeter line would have been from the tip of Mackay Island south to Bells Island, east to the tip of Churchs Island, due east to a north line to the eastern tip of Knott's Island, and thence westward along the shore of Knott's and Mackay Islands.

The average water depth was 6 feet; however, a large sandbar known as the "hump" extended diagonally from Churchs Island to Knott's Island. There the water depth averaged about 4 feet. The bottoms were mostly sand. Loam and clay were more common in the deeper western portion of the area. Most of the western portion produced few aquatic plants. Wildcelery, sago pondweed, redheadgrass, widgeongrass, bushy pondweed, and Chara sp. were often abundant in the eastern portion of the area.

Waterfowl Area No. 15 - Coinjock Bay Area included 6,070 acres of bay and marsh. The area was bounded on the north by Bells Island, on the west by the mainland, on the south by Churchs Island Causeway, and on the east by Churchs Island. Cedar Bay and Piney Island Bay were included in this area. Loam and clay soils occurred in the deeper portions of Coinjock Bay; sands and silts were common in the eastern bays. Water depths averaged about 4.5 feet. Bushy pondweed, wildcelery, Chara sp., redheadgrass, Nitella, widgeongrass, and dwarf spikerush were common but not always abundant.

Waterfowl Area No. 16 - Marshes and Shoal Waters from Swan Island to Currituck Lighthouse included 10,490 acres bounded by a line from Swan Island to Knott's Island, thence to Mary's Island, and east to the lighthouse at the Whaleshead Hunting Lodge. The eastern edge was the sand dune of the outer banks. The water depth averaged about 3 feet. The bottoms were predominantly sand with some loam on the western side. The marshes were a more homogenous mixture of cattail, needlerush, and big cordgrass than the more varied marshes of Back Bay. Some three-square and common spikerush occurred in the marshes.

Waterfowl Area No. 17 --North end of Churchs Island south to Poplar Branch Marsh included 11,730 acres of open bay on the west side of Currituck Sound. The eastern edge extended to Monkey and Mary's Islands. Virtually no marsh was included in the area. The Currituck Sound Sanctuary was entirely within Area No. 17.

The average water depth was about 5.7 feet. Sand bottom was most common, but some loam and silt soils occurred over extensive areas. Most of the common aquatics, except sagittaria, were found in abundance. Bushy pondweed, wildcelery, and widgeongrass were normally abundant, with fair amounts of sago pondweed, redheadgrass, and Chara sp.

Waterfowl Area No. 18 - Bay and Marsh from Currituck Lighthouse to south end of Mossey Island Marsh included 17,950 acres. The area was bounded on the west by a line south from Mary's Island midway through the Narrows that separated the marsh near Poplar Branch into the east and west sides of Currituck Sound. The average water depth was about 3 feet. The bottom was predominantly sand and silt. Most submerged aquatics, other than sagittaria, were common to abundant. Bushy pondweed, wildcelery, sago pondweed, redheadgrass, widgeongrass, and Chara sp. were normally abundant. The marsh consisted primarily of big cordgrass and needlerush, but there were some fairly abundant stands of cattail, common spikerush, saltmeadow cordgrass, saltgrass, marsh elder, etc.

Waterfowl Area No. 19 - Poplar Branch Marsh and Bays south to lower end of DewsQuarter Island included 8,520 acres on the west side of Currituck Sound. It was bounded by Area 17 on the north, Area 18 on the east, and Area 20 on the south. The average water depth was about 5.4 feet. The bottoms were mixed patches of sand, loam, and silt. Submerged aquatics were normally abundant; bushy pondweed, wildcelery, widgeongrass, sago pondweed, and redheadgrass were frequently abundant. The marsh vegetation was predominantly needlerush, big cordgrass, cattail, three-square, saltmarsh cordgrass, and sawgrass.

Waterfowl Area No. 20 - South end of Currituck Sound included 18,060 acres of open sound-with an insignificant edge of marsh south of Mossey Island on the east side and south of **Dews** Quarter Island on the west to Wright Memorial Bridge. The average water depth was 6.8 feet. The bottom was predominantly sand. The area was normally only poorly to moderately vegetated with **bushy pondweed**, widgeongrass, wildcelery, redheadgrass, and sago pondweed.

The narrow edges of marsh were predominantly needlerush, sawgrass, cattail, and big cordgrass on the western side of the sound; and needlerush, big cordgrass, cattail, sedge, ludwigia, wild millet, **hightide** bush, etc., on the east side of the sound.

## WATERFOWL FOOD HABITS

### Food Habits of Waterfowl on Back Bay, Virginia, and Currituck Sound, North Carolina, 1904-1927.

The U. S. Fish and Wildlife Service records at Patuxent Wildlife Research Center contained 42 waterfowl food habits analyses for Back Bay and 748 for Currituck Sound. These were from waterfowl gizzards collected in the area between 1904 and 1927. These analyses did not indicate actual volume of the contents, so only the percent frequencies of food items are shown in the tables and compared to current data.

The table on food habits of ducks from Back Bay from 1910-24 shows that for the total duck category the percent frequencies of the most frequently encountered foods were: widgeongrass - 64 percent, unidentified pondweed - 52 percent, three-square - 43 percent, sago pondweed - 33 percent, Najas - 31 percent, smartweed - 21 percent, wax-myrtle - 19 percent, wildcelery - 14 percent, unidentified bulrush - 10 percent, and Chara spp. - 7 percent. Insects and gastropods occurred in 10 percent and 5 percent, respectively, of the total ducks examined.

On Currituck Sound the 10 most frequently encountered foods and the percent frequencies in the total ducks in the period 1904-27 were: widgeongrass - 80 percent, unidentified pondweed - 78 percent, Chara spp. - 30 percent, unidentified bulrush - 25 percent, Najas - 22 percent, wax-myrtle - 16 percent, wildcelery - 15 percent, smartweed - 14 percent, sago pondweed - 11 percent, and Eleocharis sp. - 8 percent. Redheadgrass ranked 12th with 4 percent frequency,

The percent frequencies of animal material in the total ducks from Currituck Sound were: Insecta - 13 percent, Crustacea - 6 percent, Gastropoda - 4 percent, Pelecypoda - 3 percent, Arachnoidea - 3 percent, and unidentified animal matter - 3 percent. Animal matter was of principal importance to mergansers, ruddy ducks, American goldeneye, bufflehead, scaup, black ducks, pintail, and teal.

The Back Bay data from 1910-24 represented 31 dabbling ducks and 11 diving ducks. The Currituck Sound data included 25.6 dabbling ducks, 250 diving ducks, and 9 mergansers in the total of 515 ducks, plus 233 coots in 748 total waterfowl from 1904 to 1927.

The coots on Currituck Sound fed most frequently on Najas - 86 percent, widgeongrass - 83 percent, sago pondweed - 69 percent, Chara spp. - 61 percent, unidentified pondweed - 14 percent, wildcelery - 12 percent, and redheadgrass - 12 percent. All other plant foods were of minor importance to coots and no animal foods were recorded.

The frequencies of certain principal aquatics and corn (Zea mays) in the waterfowl diet are compared for the periods 1904-27 and 1958-61. Pondweeds and widgeongrass were more important for dabbling ducks in the earlier period. Probably much of the unidentified pondweed in the earlier period was sago pondweed. Widgeongrass occurred in 76

Table . Percent Frequency of Major Food Items Contained in the Gizzard Contents of Dabbling Ducks on Back Bay, Virginia, and Currituck Sound, North Carolina; as Determined from 281 Gizzards Collected from 1904 - 1927 and from 355 Gizzards Collected from 1958 - 1961.

Dabblers	Plant Material								
	Potamogeton		Ruppia	Najas	Chara	Vallisneria	Sagittaria	Zea	
	pectinatus	perfoliatus	spp.	maritima	guadalupensis	sp.	americana	subulata	mays
<u>1904 - 1927</u>									
Mallard (58) <sup>1/</sup>	16	0	76	74	21	0	3	5	0
Black (96)	15	2	80	65	17	0	7	1	0
Gadwall (28)	0	0	14	79	32	0	0	0	0
Baldpate (34)	6	0	29	91	9	6	9	3	0
Pintail (51)	10	2	82	84	22	20	2	4	0
G. W. Teal (14)	0	29	57	93	0	0	0	14	0
Total Dabbling (281)	11	2	66	76	18	4	5	3	0
<u>1958 - 1961</u>									
Mallard (52)	37	23	0	19	19	2	0	0	6
Black (52)	17	15	4	12	13	2	2	0	8
Gadwall (17)	6	0	0	18	76	0	0	0	0
Baldpate (142)	9	15	1	27	77	9	9	0	1
Pintail (50)	26	24	6	28	36	0	4	0	0
G. W. Teal (42)	10	2	7	10	7	5	0	0	2
Total Dabbling (355)	17	15	3	21	45	5	5	0	3

<sup>1/</sup> Number of each species from which the respective percents were computed.

Table . Percent Frequency of Major Food Items Contained in the **Gizzard** Contents of Waterfowl on Back Bay, Virginia, and Currituck Sound, North Carolina as Determined from 775 Gizzards Collected from 1904 - 1927 and from 622 Gizzards Collected from 1958 - 1961.

Waterfowl	Plant Material								
	Potamogeton			Ruppia	Najas	Chara	Vallisneria	Sagittaria.	Zea
	pectinatus	perfoliatus	spp.	maritima	guadalupensis	sp.	americana.	subulata	mays
<u>1904 - 1927</u>									
Redhead (27) <sup>1/</sup>	30	7	48	52	15	0	7	4	0
Canvasback (7)	57	0	43	43	14	14	14	0	0
<b>Ringneck</b> (4)	0	0	50	50	0	75	25	0	<b>0</b>
Lesser Scaup (131)	6	2	92	92	31	57	27	1	0
Greater Scaup (65)	9	0	94	89	34	65	37	0	0
American Goldeneye (7)	57	29	100	71	14	100	14	0	0
Ruddy' (16)	50	31	100	94	<b>44</b>	69	6	0	0
Bufflehead (4)	0	0	25	<b>50</b>	0	50	25	0	0
Total Diver (261)	15	5	86	84	29	54	26	1	0
Total Dabbling (281)	11	2	66	76	18	4	5	3	0
Total Duck (542)	13	4	75	80	23	28	15	2	0
Coot (233)	69	12	14	83	86	61	12	0	0
Total Waterfowl (775)	30	6	57	81	42	38	14	1	<b>0</b>
<u>1958 - 1961</u>									
Redhead (13)	23	0	0	23	62	8	23	0	0
Canvasback (6)	67	50	0	83	17	0	17	0	0
<b>Ringneck</b> (65)	45	43	9	55	37	0	6	0	<b>8</b>
Lesser Scaup (17)	47	29	6	41	24	6	18	0	0
Greater Scaup (7)	57	29	0	57	57	14	14	0	0
American Goldeneye (2)	50	0	0	50	0	0	0	0	0
Ruddy (55)	24	33	2	67	13	2	5	0	0
Bufflehead (12)	17	25	8	58	50	0	0	0	0
Total Diver (177)	36	33	5	57	31	2	8	0	<b>3</b>
Total Dabbling (355)	17	15	3	21	45	5	5	0	3
<b>Total</b> Duck (532)	23	21	4	33	40	4	6	<b>0</b>	3
coot (90)	4	2	0	1	98	2	4	0	0
Total Waterfowl (622)	20	18	3	28	49	4	6	0	2

<sup>1/</sup> Number of each species from which the respective percents were computed.

percent of the dabblers in the early period but in only 21 percent of the recent samples. The frequency of Najas in dabblers increased from 18 to 45 percent in the two sample periods, and redheadgrass increased from 2 to 15 percent. Chara spp. and wildcelery occurred in about equal frequency in dabbling ducks in the two periods. Corn was not found in dabbling ducks in the early period, but occurred in 3 percent in the period 1958-61.

The comparison of the percent frequencies of certain food items in diving duck gizzards between the periods 1904-27 and 1958-61 again shows a greater frequency of widgeongrass (84 percent) in the earlier period. Similar to the dabbling ducks, the diving ducks were reported to have used sago pondweed more frequently in the later period, but the nonidentified category probably included more sago in the early period. Najas occurred in 29 percent of the diving ducks in the earlier period compared to 31 percent in 1958-61. Chara sp. and wildcelery were less frequently encountered in the later period. Chara sp. occurred in 54 percent of the diving ducks in the early period compared to 2 percent in 1958-61. The use of wildcelery by diving ducks decreased from 26 to 8 percent in the two periods. The use of corn by diving ducks increased from 0 to 3 percent in the two periods.

There was considerable change in coot food habits in the two periods. In the later period the coots were feeding almost exclusively on Najas; it occurred in 98 percent of the gizzards and other items were infrequent. However, in the period 1904 to 1927, the most frequently encountered foods were Najas - 86 percent, widgeongrass - 83 percent, sago pondweed - 69 percent, Chara spp. - 61 percent, unidentified pondweed - 14 percent, redheadgrass - 12 percent, and wildcelery - 12 percent. To further explore this oddity, comparison was made to the 117 coot gizzards collected in 1962; this series of analyses shows a greater variety of aquatics in the diet of the coot than the 1958-61 series. The 1962 series shows 99 percent frequency of Najas, but also 23 percent Chara spp., 18 percent widgeongrass, 12 percent redheadgrass, and 10 percent sago pondweed, etc.

Aquatic invertebrates were not frequently encountered in the diet of coot in either the periods 1904-27 or 1958-61, but occurred in 17 percent of the 117 coots examined in 1962.

### Discussion

Considering the percent frequency of each food item in the ducks from the two periods as a sample of the relative frequency of each food in the habitat, certain judgments can be made about habitat differences in the two periods. Of course, varying waterfowl species composition in the two samples makes it necessary to compare individual species food habits rather than the gross diet of dabblers, divers, etc. In this comparison the duck may be considered as a habitat sampling device.

The unidentified pondweeds recorded in the 1904-27 period are believed to be primarily sago pondweed, so probably the two should be combined. If this is true, then sago pondweed, widgeongrass, *Chara* spp., wild-celery, and *Sagittaria subulata* were more important constituents of the habitat in the period 1904-27 than in the period 1958-61. Najas and redheadgrass were more important components of the habitat in the period 1958-61.

The three types of animal 'foods, insects, crustaceans, and gastropods, were somewhat more frequently encountered in more species of waterfowl in the period 1904-27 than in the period 1958-61.

A second comparison was that of the species composition of waterfowl in the three sample periods. With the mass of data from club records, this may seem superfluous, but those records did not adequately distinguish greater scaup, lesser scaup, or ringnecks. In the period 1958-61, the waterfowl gizzards were collected as encountered with no selection of certain species; if this was equally true of the period 1904-27, the comparison has some validity in assessing relative kill. Certain clubs assisted in the 1962 collection and the separation of scaup and ring-necked ducks, and the blackhead group was not always possible. Similar data of Quay and Critcher (1962) are included but it represents only a part of the entire area; the selectivity of collection was not known. The number and percent each duck species comprised of the total samples of ducks were:

	1904-27		1947-51		1958-61		1962		Total
	No.	%	No.	%	No.	%	No.	%	
Mallard	58	10.4	3		52	9.4	76	8.0	189
Black	96	17.2	22	7.5	52	9.4	103	10.8	273
<b>Gadwall</b>	28	5.0	2	0.7	17	3.1	10	1.1	57
Baldpate	34	6.1	34	11.6	142	25.7	109	11.4	319
<b>Pintail</b>	51	9.2	19	6.5	50	9.1	125	13.1	245
Green-winged Teal	14	2.5	17	5.8	42	7.6	127	13.3	200
Blue-winged Teal	6	1.1	0	0	0	0	0	0	6
Shoveler	0	0	0	0	9	1.6	3	0.3	12
Wood Duck	0	0	0	0	4	0.7	3	0.3	7
<b>Total Dabblers</b>	<b>287</b>	<b>51.5</b>	<b>97</b>	<b>33.0</b>	<b>368</b>	<b>66.7</b>	<b>556</b>	<b>58.4</b>	<b>1,308</b>
Redhead	27	4.8	44	15.0	13	2.3	(8)*		92
Canvasback	7	1.3	62	21.1	6	1.1	(5)*		80
<b>Ringneck</b>	4	0.7	5	1.7	65	11.8	179	18.8	253
Lesser scaup	131	23.5	5	1.7	17	3.1	8	6.8	218
Greater scaup	65	11.7	0	-	7	1.3	12	0.8	80
(Blackhead)	-	-	-	-	-	-		1.3	12
American Goldeneye	7	1.3	0	0	2	0.4	1	0.1	10
Ruddy Duck	16	2.9	75	25.5	55	10.0	104	10.9	250
Bufflehead	4	0.7	5	1.7	12	2.2	26	2.7	47
Old Squaw	0	0	1	0.3	1	0.2			2
<b>Common scoter</b>	0	0					1	0.1	1
<b>Total Divers</b>	<b>261</b>	<b>46.9</b>	<b>197</b>	<b>67.0</b>	<b>178</b>	<b>32.2</b>	<b>396</b>	<b>41.6</b>	<b>1,045</b>
Mergansers	9	1.6			6	1.1			15
<b>Total Ducks</b>	<b>557</b>		<b>294</b>		<b>552</b>		<b>952+(13)*</b>		<b>2,368</b>

\* Specific collection and not in total.

Assuming that harvest and collection of gizzards were made at random it was concluded that diving ducks were relatively more important in the 1947-51 period. Lesser **scaup** were killed more frequently in the period 1907-27, for they comprised 23.5 percent of the collection. Ring-necked ducks were common in the latter two collection periods, but scarce in the two earlier periods.

The last column in the table summarizes the total number of food habits analyses of ducks known to have been conducted for Back Bay and Currituck Sound. Of the total of 2,368 ducks, 1,308 were dabbling ducks, 1,045 were diving ducks including ruddy ducks, and 15 were mergansers. The number of redhead ducks and canvasback specifically collected for food habits analyses was not included in the subtotal or percent composition, but are in the total.

#### Food Habits of Waterfowl on Currituck Sound, North Carolina, 1947-1952.

Quay and Critcher (1962) presented a paper on the food habits of 326 waterfowl of 15 species collected on Currituck Sound between 1947 and 1952. They state "Potamogeton, Ruppia, and Najas were the overwhelmingly important foods for all groups, totaling about 80% **by volume for the** entire sample. Vallisneria, now present in the Sound in good supply, did not appear in any of the gizzards examined and very possibly was relatively rare or spotty in the Sound during the 1947-1952 period. Ninety-seven percent of the total volume was plant material and three percent animal matter."

#### Waterfowl Food Habits on Back Bay and Currituck Sound During the 1958-1964 Study.

**Sincock** (1962) presented a paper entitled "Estimating Consumption of Food by Wintering Waterfowl Populations." The methods described in that paper show how waterfowl food habits can be weighted to represent the wintering waterfowl population when the species composition and population are known (see Appendix). Further, since individual daily consumption was assumed to be 10 percent of the body weight of each waterfowl species the total consumption of each food item for each wintering period **was** calculated. This permitted comparison of the use of each submerged aquatic to the quantity estimated from the transect surveys.

During the winters of 1958 through 1961, 825 waterfowl gizzards were collected from hunters on Back Bay and Currituck Sound. Data are presented for the entire area, rather than subdivisions, because of the frequent movement of waterfowl on the **area**.

During the winter of 1962, after the ocean water introduction, 1,201 waterfowl gizzards were collected from hunters on the area, which permitted comparison of the food habits under the different environmental conditions. Because the large whistling swan population consumed much of the food supply, 21 swans were collected by the investigators during 1962. These data were applied to each annual estimate of food consumption by swan.

Several hundred dead or sick greater snow geese were carried from the marshes, and many gizzards were collected. It was not feasible to attempt detailed food habits because the contents were primarily roots and basal portions of a variety of marsh plants. Submerged aquatic plants were not important to the greater snow geese.

Based on the estimated total food consumption of each food item by each waterfowl species and the primary source of each food item, the percentages of food originating in the field, marsh, or bay are shown for each species of waterfowl for the periods 1958-61 and 1962-63.

The table comparing the sources of the food by waterfowl groups from these two periods shows that the major difference was that the bay provided only 24 percent of the food for Canada geese in the period 1958-61, but it provided 57 percent of their food in 1962.

In the two periods, 61 to 65 percent of the dabbling duck food was from the bay habitat; and 92 to 98 percent of the diving duck food was from the bay. Almost all of the food of the coots and swans was from the bay. The bay habitat was of slightly greater importance for all groups in 1962. The habitat use data for all groups are weighted by the known food habits and population composition and level. Therefore the indicated use of each habitat changed in accordance with a change in food habits and also the population of each species of waterfowl.

Conventional food habits tables on the volume and frequency of food items are presented for each waterfowl species for comparison to other conventional food habits work; however, the more representative data on the food demand by each component of the waterfowl population are most useful.

Total Food Consumption from the Bay Habitat

The total dry weight of plant and animal food from the bay habitat that waterfowl consumed is presented by waterfowl species for each year from 1958 through 1963 in the tables (see Appendix). The consumption of plant and animal food by waterfowl from the bay habitat was as follows:

1958	3,003,483	lb. dry-weight
1959	5,289,093	
1960	6,989,457	
1961	5,133,602	
1962	9,441,158	
1963	7,137,626	

The quantities of submerged aquatics (in thousands of pounds dry weight) consumed each year by waterfowl were as follows:

	<u>1958</u>	<u>1959</u>	<u>1960</u>	<u>1961</u>	<u>1962</u>	<u>1963</u>
Sago pondweed	300	492	663	609	809	677
Wildcelery	151	274	331	293	570	504
Najas	1,734	2,810	3,680	3,093	5,277	3,859
Redheadgrass	208	378	445	404	834	657
Widgeongrass	212	366	467	453	1,516	1,091
<u>Chara</u> spp.	51	89	1 0 4	97	194	162
<u>Nitella</u> spp.	10	12	15	16	14	9
Dwarf spikerush	3	3	2	4	35	24
Sagittaria subulata	15	22	36	32	41	29
Potamogeton berchtoldi	<u>7</u>	<u>10</u>	<u>11</u>	<u>15</u>	<u>6</u>	<u>3</u>
Total	2,692	4,455	5,755	5,015	9,296	7,017

The differences between the totals of submerged aquatic consumption and the total food consumption from the bay represented animal food from the bay.

#### Food Consumption by Waterfowl and the Annual Standing Crops of Submerged Aquatics

No known precedence exists for quantitatively relating food demand and supply for waterfowl. One method would be to compare demand to the standing crop indicated by the November transect survey. However, this would erroneously assume that the standing crop in November remained available throughout the winter. Natural disintegration, destruction by storms, consumption by carp, etc., all serve to deplete the supply of food existing in November. A more realistic assumption was that the standing crop of aquatics available to waterfowl was the average of the supply existing in the entire winter period.

The transect surveys showed the lowest yield for certain aquatics, e.g. sago pondweed, wildcelery, redheadgrass, widgeongrass, and generally Sagittaria sp. was in February. Najas, Eleocharis parvula, and the muskgrasses occurred in the least quantity in May.

Therefore, the standing crop of each aquatic was computed on the basis of the average of the quantity in November and the lowest subsequent quantity in either February or May. In certain years, either the February or May surveys were not conducted and the quantities are estimated for these periods, based on characteristics of the preceding or following years.

As defined, the average annual standing crop, in thousands of pounds dry weight, of each important aquatic was:

	<u>1958</u>	<u>1959</u>	<u>1960</u>	<u>1961</u>	<u>1962</u>	<u>1963</u>
Sago pondweed	2,111	1,940	2,997	2,226	6,687	2,086
Wildcelery	171	728	1,159	962	387	602
Najas	8,596	12,942	14,993	11,172	11,402	9,580
Redheadgrass	114	2,085	2,804	1,905	3,138	2,936
Widgeongrass	7	146	2,599	1,327	4,039	4,395
<u>Chara</u> sp.	<u>1,816*</u>	<u>3,872*</u>	968	2,176	2,679	1,250
<u>Nitella</u> spp.	<u>1,816*</u>	<u>3,871*</u>	1,234	761	283	58
Total muskgrass	3,632	7,743	2,202	2,937	2,962	1,308
Eleocharis sp.	0	243	315	114	121	71
Sagittaria sp.	4	26	150	150	103	104
Total	14,635	25,853	27,219	20,793	28,839	21,082

\* Arbitrarily divided for period in which individual estimates were not available.

Percent Consumption by Waterfowl of the Annual Standing Crop of Aquatic Plants

The percentage use of the standing crop of aquatics by waterfowl was as follows:

	<u>1958</u>	<u>1959</u>	<u>1960</u>	<u>1961</u>	<u>1962</u>	<u>1963</u>
Sago pondweed	14.2	25.4	22.1	27.4	12.1	32.5
Wildcelery	88.3	37.6	28.6	30.5	(100.0)	83.7
Najas	20.2	21.7	24.5	27.7	46.3	40.3
Redheadgrass	(100.0)	18.1	15.9	21.2	26.6	22.4
Widgeongrass	(100.0)	(100.0)	18.0	34.1	37.5	24.8
<u>Chara</u> spp.	2.8	2.3	10.7	4.4	7.3	13.0
<u>Nitella</u> spp.	0.6					
Dwarf spikerush	(100.0)	0.3 1.2	0.6 1.2	3.5 2.1	28.9 4.9	15.5 33.8
<u>Sagittaria subulata</u>	(100.0)	84.6	24.0	21.3	39.8	27.9
Total Aquatics	18.4	17.2	21.1	24.1	32.2	30.0

The assignment of a constant percentage of consumption of each food item to each year from 1958 through 1961 for calculation of the above data presents the obvious error (indicated as 100 percent) of consumption exceeding the supply. Another cause of this is that confidence limits were quite wide on estimates of supply when the food items were scarce.

The assignment of a constant percentage consumption of each food item by each waterfowl species from all data from 1958 through 1961 to each year in that period, and for the 1962 data to the 1963 data, is necessitated by inadequate sampling of certain waterfowl species in some years. It provides the most realistic concept of food habits with the existing data.

The percentages each aquatic comprised of the standing crop of aquatics were:

	<u>1958</u>	<u>1959</u>	<u>1960</u>	<u>1961</u>	<u>1962</u>	<u>1963</u>
Sago	14.4	7.5	11.0	10.7	23.2	9.9
Wildcelery	1.2	2.8	4.3	4.6	1.3	2.9
Najas	58.7	50.1	55.1	53.7	39.5	45.4
Redheadgrass	0.8	8.1	10.3	9.2	10.9	13.9
Widgeongrass	Tr.	0.6	9.5	6.4	14.0	20.8
Chara spp.	12.4	15.0	3.6	10.5	9.3	5.9
Nitella spp.	12.4	15.0	4.5	3.7	1.0	0.3
Total Muskgrass	24.8	30.0	8.1	14.1	10.3	6.2
Dward spikerush	0	0.9	1.2	0.5	0.4	0.3
Sagittaria sp.	Tr.	0.1	0.6	0.7	0.4	0.5

The percentages each aquatic comprised of the total aquatics consumed were:<sup>1/</sup>

	<u>1958</u>	<u>1959</u>	<u>1960</u>	<u>1961</u>	<u>1962</u>	<u>1963</u>
Sago	11.1	11.0	11.5	12.1	8.7	9.6
Wildcelery	5.6	6.2	5.8	5.8	6.1	7.2
Najas	64.4	63.1	63.9	61.7	56.8	55.0
Redheadgrass	7.7	8.5	7.7	8.1	9.0	9.4
Widgeongrass	7.9	8.2	8.1	9.0	16.3	15.5
Chara spp.	1.9	2.0	1.8	1.9	2.1	2.3
Nitella spp.	0.4	0.3	0.3	0.3	0.1	0.1
Total Muskgrass	2.3	2.3	2.1	2.2	2.2	2.4
Dward spikerush	0.1	0.1	Tr.	0.1	0.4	0.3
Sagittaria sp.	0.5	0.5	0.6	0.6	0.4	0.4

<sup>1/</sup> 1958-61 data based on aggregate data analyses; the minor differences result only from changes in population composition of waterfowl.

Proportional consumption and supply possibly indicate lack of preference. Proportionally high consumption in relation to supply would indicate preference; low consumption in relation to supply would indicate rejection of certain aquatics.

The difference in the use of the standing crop of sago pondweed between 1961 and 1962 was relatively great, but no explanation is obvious. Sago pondweed was most abundant in 1962 and constituted 23 percent of the standing crop of all aquatics, but a smaller percentage of the standing crop was consumed than in other years. The comparison of percentages that sago pondweed comprised of the standing crop and of the total aquatic consumption indicates proportional selection, except in 1962 when it was only 8.7 percent of the total consumption; this would indicate some degree of rejection.

The apparent lack of wildcelery in the diet of waterfowl on Back Bay and Currituck Sound was previously noted. However, this analysis of the percentage use of the standing crop shows that wildcelery was used intensively in proportion to the supply. The percentage use of the standing crop ranged from 28 to 100 percent. During the 6-year period, it composed only 1.2 to 4.6 percent of the supply, but wildcelery averaged about 6 percent of the total aquatic consumption, indicating preference. The natural disintegration of wildcelery and the consumption by carp were mentioned. It is concluded that wildcelery is a favored food of waterfowl in the Back Bay Currituck Sound Area; however, it is not a dependable source of food in that habitat.

Najas was used to a greater extent than any other aquatic, ranging from 55.0 to 64.4 percent of the total aquatic consumption. Preference was indicated by proportionally greater use than supply, relative to other aquatics. This might be expected with the most dominant and widely distributed aquatic, regardless of preference. The use of the standing crop ranged from 20 to 46 percent from 1958 to 1963, respectively.

Redheadgrass ranged from 7.7 to 9.4 percent of the total aquatic consumption during the 6-year period. Consumption was slightly below the relative supply, but was fairly proportional, indicating a lack of either strong preference or dislike. From 1959 through 1963, the consumption of the standing crop ranged from 15.9 to 26.6 percent. Because of either the variance of the vegetation survey or nonrepresentative data from the food habits survey and weighting methods, consumption was shown to exceed the supply in 1958. This is indicated as 100 percent in the table.

The same type of error occurred for widgeongrass in 1958 and 1959. It should be noted that the estimates of the standing crop of redheadgrass were lowest in 1958 and 1959. The variance of the estimate was therefore probably much greater.

From 1960 through 1962 the use of the standing crop of widgeongrass increased from 18.0 to 37.5 percent. In general, percentage use of the supply was greater than in most other aquatics. This would indicate a slight preference for widgeongrass. In 1962 it comprised 14 percent of the standing crop of aquatics and 16 percent of the total aquatic consumption.

The estimated consumption of the standing crop of Chara spp. ranged from 2.3 to 13.0 percent. This consumption represented only 1.8 to 2.3 percent of the total aquatic consumption. Chara spp. represented 3.6 to 15 percent of the standing crop of aquatics, averaging about 10 percent. This indicates a definite rejection of Chara spp. in the total waterfowl diet.

The estimated consumption of the standing crop of Nitella ranged from 0.3 to 15.5 percent. The consumption of Nitella spp. comprised only 0.1 to 0.4 percent of the total aquatic consumption by waterfowl. The standing crop of Nitella declined fairly progressively from 12.4

Table \_\_\_\_\_ Waterfowl Days Use of Major Species on Back Bay, Virginia, and Currituck Sound, North Carolina, During the Wintering Periods 1958 through 1963.

Species	1958-59	1959-60	1960-61	1961-62	1962-63	1963-64
Mallard	71,700	133,600	222,400	153,500	279,900	94,200
Black Duck	425,900	661,600	728,800	818,600	1,343,600	842,200
Gadwall	8,400	11,400	13,500	13,100	23,900	14,600
Baldpate	1,291,400	1,506,400	1,605,600	1,978,100	2,661,300	1,455,500
Pintail	363,900	501,200	560,900	762,100	1,369,800	385,900
G.W. Teal	37,500	147,700	169,600	255,800	328,600	442,700
B.W. Teal	61,500	40,900	62,200	100,700	34,300	55,600
Wood Duck	--	1,500	300	3,300	9,400	1,700
Shoveler	1,400	4,200	1,300	7,800	12,400	14,200
Total Dabblers,	2,261,700	3,008,500	3,364,600	4,093,000	6,063,200	3,306,600
Redhead	159,900	81,000	273,900	209,200	458,800	843,200
Canvasback	309,200	223,100	740,300	800,700	1,729,600	1,774,400
Ring-necked Duck	311,100	715,500	1,072,300	1,583,700	775,200	916,200
Gr. & Lr. Scaup	125,800	44,300	2,300	83,000	48,500	287,600
Bufflehead	1,500	2,100	3,100	4,900	4,700	4,100
Ruddy Duck	59,200	323,400	760,800	1,428,800	284,300	1,973,300
American Goldeneye	100	400	100	400	100	--
Total Diver:	966,800	1,389,800	2,852,800	4,110,700	3,301,300	5,798,800
Merganser	100	1,500	900	800	12,800	--
Total Duck	3,228,600	4,399,800	6,218,300	8,204,900	9,377,300	9,105,400
Coot	2,521,800	2,709,500	5,081,100	3,850,200	1,020,200	2,464,400
Canada Geese	3,189,300	4,578,900	7,683,800	6,652,400	8,566,700	5,864,000
Snow Geese	2,638,400	3,734,900	4,057,700	4,101,500	4,938,900	4,842,300
Whistling Swan	962,500	1,933,800	2,068,400	1,660,000	2,760,100	1,902,400
American Brant	73,000					
Total Waterfowl	12,613,600	17,356,900	25,109,300	24,469,000	26,663,200	24,178,500

Table \_\_\_\_\_, Estimated Food Consumption (Pounds Dry-weight) of Waterfowl Populations on Back Bay, Virginia, and Currituck Sound, North Carolina, During the Wintering Periods 1958 through 1963.

Species	Rate <sup>1/</sup> of Consumption	1958-59	1959-60	1960-61	1961-62	1962-63	1963-64
Mallard	0.25	17,900	33,400	55,600	38,400	70,000	23,500
Black Duck	0.25	106,500	165,400	182,200	204,600	335,900	210,600
Gadwall	0.19	1,600	2,200	2,600	2,500	4,500	2,800
Baldpate	0.16	206,600	241,000	256,900	316,500	425,800	231,300
Pintail	0.20	72,800	100,200	112,200	152,400	274,000	77,200
G. W. Teal	0.08	3,000	11,800	13,600	20,500	26,300	35,400
B. W. Teal	0.09	5,500	3,700	5,600	9,100	3,100	5,000
Wood Duck	0.15	0	200	100	500	1,400	300
Shoveler	0.14	200	600	200	1,100	1,700	2,000
Total Dabbling		414,100	558,500	629,000	745,600	1,142,700	588,100
Redhead	0.24	38,400	19,400	65,700	50,200	110,100	202,400
Canvasback	0.27	83,500	60,200	200,000	216,200	467,000	479,100
Ring-necked Duck	0.16	49,800	114,500	171,600	253,400	124,000	146,600
Gr. & Lr. Scaup	0.20	25,200	8,900	500	16,600	9,700	57,500
Bufflehead	0.09	100	300	300	400	400	400
Ruddy Duck	0.12	7,100	38,800	91,300	171,500	34,100	236,800
American Goldeneye	0.20	Tr.	100	Tr.	100	Tr.	0
Total Diver		204,100	242,200	529,400	708,400	745,300	1,122,800
Merganser	0.20						
Total Duck		618,200	800,700	1,158,400	1,454,000	1,888,000	1,710,900
Coot	0.12	302,600	325,100	609,700	462,000	122,400	295,700
Canada Geese	0.79	2,519,500	3,617,300	6,070,200	5,255,400	6,767,700	4,632,600
Snow Geese	0.68	1,794,100	2,539,700	2,759,200	2,789,000	3,358,500	3,292,800
Whistling Swan	1.47	1,414,900	2,842,700	3,040,500	2,440,200	4,057,300	2,796,500
American Brant	0.40	29,200					
Total Waterfowl		6,678,500	10,125,500	13,638,000	12,400,600	16,193,900	12,728,500

<sup>1/</sup> Pounds (dry weight) of food per bird per day.

Table . Comparative \*Percentages of Food from Each Source for Each Waterfowl Group for 1958-61 Food Habit Study Average and 1962 Food Habit Study on Back Bay, Virginia and Currituck Sound, North Carolina.

Species	Field		Marsh		Bay	
	1958	1962	1958	1962	1958	1962
Total Dabblers	6.29	1.57	32.96	33.53	60.76	64.90
Total Divers	0.35	1.31	7.20	0.57	92.45	98.12
Total Ducks	3.73	1.47	21.86	20.50	74.41	78.03
coot			0.20	0.10	99.80	99.90
Canada Geese	70.00	32.40	5.70	10.33	24.30	57.27
Whistling Swan				1.80	100.00	98.20
Snow Geese			100.00	100.00		
Total Waterfowl	29.41	13.69	26.22	27.92	44.37	59.39
Total Game Species	53.48	26.96	8.02	13.25	38.40	59.79

\* Percentages weighted by waterfowl days.

Note: Mergansers included in 1958-61 data but not included in 1962 data.

Total game species include all except swan and snow geese 1958-61.

Total game species include all except swan, snow geese, redheads, and canvas-backs 1962.

Table \_\_\_\_\_, Percentages of Each Major Submerged Aquatic Plant in the Food Habits of Common Waterfowl Species on Back Bay, Virginia, and Currituck Sound, North Carolina, During the Period 1958-61.

Species	Sago Pondweed	Wild- celery	Najas	Redhead- grass	Widgeon- grass	Chara	Nitella	Dwarf Spikerush	Sagittaria subulata	Potamogeton berchtoldi	Total
Mallard	8.0		6.4	1.5	2.0			Tr.			17.9
Black Duck	4.1	1.5	7.3	5.5	0.7	Tr.					19.1
Gadwall	Tr.		66.4		3.5			7.6			77.5
Baldpate	4.5	2.2	52.4	9.3	15.0	5.1	3.8	Tr.		0.2	92.5
Pintail	5.9	0.1	24.7	8.5	4.6			2.0		8.7	54.5
G. W. Teal	1.0		0.5		0.1	0.5		0.1		0.4	2.6
B. W. Teal											
Wood Duck											
Shoveler	0.8				14.3		6.3	Tr.			21.4
Redhead.	25.3	Tr.	46.8		11.2	6.1					89.4
Canvasback	38.1	21.0	0.7	6.2	4.0						70.0
Ring-necked Duck	8.0	9.4	13.0	7.2	12.5					0.3	50.4
Gr. & Lr. Scaup	27.1	2.9	24.7	1.1	6.4	1.2		4.5		Tr.	67.9
Bufflehead	2.4		23.1	0.3	23.7						49.5
Ruddy Duck	23.9	1.3	1.5	12.1	34.5	6.9					80.2
American Goldeneye	5.6				Tr.						5.6
coot	0.9	0.7	96.8	0.1	Tr.	0.3	0.8				99.6
Canada Geese	2.5	0.1	17.8	1.0	1.9	0.1		Tr.	0.6		24.0
Snow Geese											
Whistling Swan <sup>1/</sup>	11.4	8.3	58.3	10.0	7.8	2.4					98.2

<sup>1/</sup> Swan analysis from 1962.

Table \_\_\_\_\_, Percentages of Each Major Aquatic Plant in the Food Habits of Common Waterfowl **Species** on Back Bay, Virginia, and Currituck Sound, North Carolina, During the Wintering Period 1962-63<sup>1/</sup>,

<b>Species</b>	<b>Sago Pondweed</b>	<b>Wild- celery</b>	<b>Najas</b>	<b>Redhead- grass</b>	<b>Widgeon- grass</b>	<b>Chara</b>	<b>Nitella</b>	<b>S ikerush</b>	<b>Dwarf Sagittaria subulata</b>	<b>Potamogeton berchtoldi</b>	<b>/Total</b>
Mallard	8.0	2.1	19.2	3.7	5.9	0.6		0.1		0.3	39.9
Black Duck	12.4	0.5	13.3	1.9	10.0			0.8	1.6	0.9	41.4
<b>Gadwall</b>	0.4			2.0	86.7						89.1
Baldpate	0.7	3.0	40.3	4.7	27.6	0.1		0.1	0.2		76.7
<b>Pintail</b>	9.3	1.6	9.9	1.5	16.1	2.5	Tr.		0.3	0.1	41.3
G. W. Teal	2.1	1.0	1.1	1.8	8.2	0.9	Tr.	16.3	0.1	0.4	31.9
Shoveler		12.2			32.7	0.2					45.1
Redhead	23.9		60.2	1.2	14.7						100.0
Canvasback	16.1	34.2	Tr.	32.4	15.3						98.0
Ring-necked Duck	28.8	6.9	5.4	16.4	15.4	2.3		0.1	Tr.	0.4	75.7
Gr. & Lr. <b>Scaup</b>	20.2	5.0	10.1	8.0	4.7	4.7			1.6	Tr.	54.3
Bufflehead											
Ruddy Duck	22.9	24.8	0.9	10.1	13.8	10.8				Tr.	83.3
American Goldeneye				10.0	80.0						90.0
coot	1.4	1.1	90.1	0.6	1.8	3.3	Tr.	0.7	0.2		99.2
Canada Geese	1.8	0.5	36.5	3.2	13.0	1.1	0.2	0.3	0.5		57.2
Whistling Swan	11.4	8.3	58.3	10.0	7.8	2.4					98.2

<sup>1/</sup> These data also used in estimating diet in 1963-64.

Table \_\_\_\_\_, Estimated Consumption (Pounds Dry Weight) of Major Submerged Aquatic Plants by Waterfowl on Back Bay, Virginia, and Currituck Sound, North Carolina, During the Wintering Period 1958-59.

Species.	Sago Pondweed	Wild- celery	Najas	Redhead- grass	Widgeon- grass	Chara	Nitella	Dwarf Spikerush
Mallard	1,432		1,146	269	358			Tr.
Black Duck	4,367	1,598	7,775	5,858	746	Tr.		
Gadwall	Tr.		1,062		56			122
Baldpate	9,297	4,545	108,258	19,214	30,990	10,537	7,851	Tr.
Pintail	4,295	73	17,982	6,189	3,349			1,456
G. W. Teal	30		15		3	15		3
Shoveler	2				29		13	Tr.
Total Dabbling	19,423	6,216	136,238	31,530	35,531	10,552	7,864	1,581
Redhead	9,715	Tr.	17,971		4,301	2,342		
Canvasback	31,814	17,535	585	5,177	3,340			
Ring-necked Duck	3,984	4,681	6,474	3,586	6,225			
Gr. & Lr. Scaup	6,829	731	6,224	277	1,613	302		1,134
Bufflehead	2		23	Tr.	24			
Ruddy Duck	1,697	92	106	859	2,450	490		
American Goldeneye					Tr.			
Total Diver	54,041	23,039	31,383	9,899	17,953	3,134		1,134
Total Duck	73,464	29,255	167,621	41,429	53,484	13,686	7,864	2,715
Coot	2,723	2,118	292,916	302	Tr.	908	2,421	
Canada Geese	62,988	2,520	448,471	25,195	47,871	2,520		Tr.
Whistling Swan	161,299	117,437	824,887	141,490	110,362	33,958		
Total Waterfowl	300,474	151,330	1,733,895	208,416	211,717	51,072	10,285	2,715
Percent:	11.2	5.6	64.4	7.7	7.8	1.9	0.4	0.1

Table \_\_\_\_\_. (Cont'd) Estimated Consumption (Pounds Dry Weight) of Major Submerged Aquatic Plants by Waterfowl on Back Bay, Virginia, and Currituck Sound, North Carolina, During the Wintering Period 1958-59.

Species	Sagittaria		Potamogeton		
	subulata		berchtoldi	Total	
				Percent	
Mallard				3,205	0.1
Black Duck				20,344	0.8
<b>Gadwall</b>				1,240	Tr.
Baldpate		413		191,105	7.1
<b>Pintail</b>		6,334		39,678	1.5
G. W. Teal		12		78	Tr.
Shoveler				44	Tr.
Total Dabbling		6,759		255,694	9.5
Redhead				34,329	1.3
Canvasback				58,451	2.2
Ring-necked Duck		149		25,099	0.9
Gr. & Lr. Scaup		Tr.		17,110	0.6
<b>Bufflehead</b>				49	Tr.
Ruddy Duck				5,694	0.2
American Goldeneye				Tr.	Tr.
Total Diver		149		140,732	5.2
Total Duck		6,908		396,426	14.7
<b>Coot</b>				301,388	11.2
Canada Geese	15,117			604,682	22.5
Whistling Swan				1,389,433	51.6
Total Waterfowl	15,117	6,908		2,691,929	100.0
Percent	0.6	0.3			

Table \_\_\_\_\_. Estimated Consumption (Pounds Dry Weight) of Major Submerged Aquatic Plants by Waterfowl on Back Bay, Virginia, and Currituck Sound, North Carolina, During the Wintering Period 1959-60.

Species	Sago				Chara	Nitella	Spikerush
	Pondweed	Wildcelery	Najas	Redheadgrass			
Mallard	2,672		2,138	501	668		Tr.
Black Duck	6,781	2,481	12,074	9,097	1,158	Tr.	
Gadwall	Tr.		1,461		77		167
Baldpate	10,845	5,302	126,284	22,413	36,150	9,158	Tr.
Pintail	5,912	100	24,749	8,517	4,609		2,004
G. W. Teal	118		59		12		12
Shoveler	5			86		38	Tr.
Total Dabblers	26,333	7,883	166,765	40,528	42,760	9,196	2,183
Redhead	4,908	Tr.	9,079		2,173		
Canvasback	22,936	12,642	421	3,732	2,408		
Ring-necked Duck	9,160	10,763	14,885	8,244	14,313		
Gr. & Lr. Scaup	2,412	258	2,198	98	570	107	401
Bufflehead	7		69	1	71		
Ruddy Duck	9,273	504	582	4,695	13,386	2,677	
American Goldeneye	6				Tr.		
Total Diver	48,702	24,167	27,234	16,770	32,921	3,967	401
Total Duck	75,035	32,050	193,999	57,298	75,681	9,196	2,584
Coot	2,926	2,276	314,697	325	Tr.	2,601	
Canada Geese	90,433	3,617	643,879	36,173	68,729	3,617	Tr.
Whistling Swan	324,068	235,944	1,657,294	284,270	221,731	68,225	
Total Waterfowl	492,462	273,887	2,809,869	378,066	366,141	11,797	2,584
Percent:	11.0	6.1	63.1	8.5	8.2	2.0	0.1

Table \_\_\_\_\_ (Cont'd) Estimated Consumption (Pounds Dry Weight) of Major Submerged Aquatic Plants by Waterfowl on Back Bay, Virginia, and Currituck Sound, North Carolina, During the Wintering Period 1959-60.

Species	Sagittaria subulata	Potamogeton berchtoldi	Total	Percent
Mallard			5,979	0.1
Black Duck			31,591	0.7
<b>Gadwall</b>			<b>1,705</b>	Tr.
Baldpate		482	222,925	5.0
<b>Pintail</b>		8,717	54,608	1.2
G. W. Teal		47	307	Tr.
Shoveler			129	Tr.
Total Dabbling		9,246	317,244	7.0
Redhead			17,343	0.4
Canvasback			42,139	0.9
Ring-necked Duck		344	57,709	1.3
Gr. & Lr. Scaup		Tr.	6,044	0.1
Bufflehead			148	Tr.
Ruddy Duck			31,117	0.7
American Goldeneye			6	Tr.
Total Diver		344	154,506	3.5
Total Duck		9,590	471,750	10.5
coot			323,800	7.3
Canada Geese	21,704		868,152	19.5
Whistling Swan			2,791,532	62.7
Total Waterfowl	21,704	9,590	4,455,234	
Percent:	0.5	0.2		100.0

Table \_\_\_\_\_ Estimated Consumption (Pounds Dry Weight) of Major Submerged Aquatic Plants by Waterfowl on Back Bay, Virginia, and Currituck Sound, North Carolina, During the Wintering Period 1960-61.

Species	Sago							Dwarf
	Pondweed	Wildcelerv	Najas	Redheadgrass	Widgeongrass	Chara	Nitella	Spikerush
Mallard	4,448		3,558	834	1,112			Tr.
Black Duck	7,470	2,733	13,301	10,021	1,275	Tr.		
Gadwall	Tr.		1,726		91			198
Baldpate	11,561	5,652	134,616	23,892	38,535	13,102	9,762	Tr.
Pintail	6,620	112	27,713	9,537	5,161			2,244
G. W. Teal	136		68		13	68		13
Shoveler	2				29		13	Tr.
Total Dabbler	30,237	8,497	180,982	44,284	46,216	13,170	9,775	2,455
Redhead	16,622	Tr.	30,748		7,358	4,008		
Canvasback	76,200	42,000	1,400	12,400	8,000			
Ring,-necked Duck	13,728	16,130	22,308	12,355	21,450			
Gr. & Lr. Scaup	135	15	124	5	32	6		22
Bufflehead	7		69	1	71			
Ruddy Duck	21,821	1,187	1,370	11,047	31,499	6,300		
American Goldeneye	Tr.							
Total Diver	128,513	59,332	56,019	35,808	68,410	10,314		22
Total Duck	158,750	67,829	237,001	80,092	114,626	23,484	9,775	2,477
coot	5,487	4,268	590,190	610	Tr.	1,829	4,878	
Canada Geese	151,755	6,070	1,080,496	60,702	115,334	6,070		Tr.
Whistling Swan	346,617	252,362	1,772,612	304,050	237,159	72,972		
Total Waterfowl	662,609	330,529	3,680,299	445,454	467,119	104,355	14,653	2,447
Percent:	11.5	5.7	64.0	7.7	8.1	1.8	0.3	0.1

Table \_\_\_\_\_ (Cont'd) Estimated Consumption (Pounds Dry Weight) of Major Submerged Aquatic Plants by Waterfowl on Back Bay, Virginia, and Currituck Sound, North Carolina, During the Wintering Period 1960-61.

Species	Sagittaria subulata	Potamogeton berchtoldi	Total	Percent
Mallard			9,952	0.2
Black Duck			34,800	0.6
<b>Gadwall</b>			2,015	Tr.
Baldpate		514	237,634	4.1
<b>Pintail</b>		9,761	61,148	1.1
G. W. Teal		54	352	Tr.
Shoveler			44	Tr.
Total Dabbling		10,329	345,945	6.0
Redhead			58,736	1.0
Canvasback			140,000	2.4
Ring-necked Duck		515	86,486	1.5
Gr. & Lr. Scaup		Tr.	339	Tr.
Bufflehead			148	Tr.
Ruddy Duck			73,224	1.3
American Goldeneye				
Total Diver		515	358,933	6.2
Total Duck		515	704,878	12.2
Coot			607,261	10.6
Canada Geese	36,421		1,456,848	25.3
Whistling Swan			2,985,772	51.9
Total Waterfowl	36,421	10,844	5,754,759	
Percent:	0.6	0.2		100.0

Table \_\_\_\_\_ Estimated Consumption (Pounds Dry Weight) of Major Submerged Aquatic Plants by Waterfowl on Back Bay, Virginia, and Currituck Sound, North Carolina, During the Wintering Period 1961-62.

Species	Sago Pondweed	Wildcelery	Najas	Redheadgrass	Widgeongrass	Chara	Nitella	Dwarf Spikerush
Mallard	3,072		2,458	576	768			Tr.
Black Duck	8,389	3,069	14,936	11,253	1,432	Tr.		
Gadwall	Tr.		1,660		88			190
Baldpate	14,243	6,963	165,846	29,435	47,475	16,142	12,027	Tr.
Pintail	8,992	152	37,643	12,954	7,010			3,048
G. W. Teal	205		103		21	103		21
Shoveler	9				157		69	Tr.
Total Dabbling	34,910	10,184	222,646	54,218	56,951	16,245	12,096	3,259
Redhead	12,701	Tr.	23,494		5,622	3,062		
Canvasback	82,372	45,402	1,513	13,404	8,648			
Ring-necked Duck	20,272	23,820	32,942	18,245	31,675			
Gr. & Lr. Scaup	4,499	481	4,100	183	1,062	199		747
Bufflehead	10		92	1	95			
Ruddy Duck	40,989	2,230	2,573	20,752	59,168	11,834		
American Goldeneye	6				Tr.			
Total Diver	160,849	71,933	64,714	52,585	106,270	15,095		747
Total Duck	195,759	82,117	287,360	106,803	163,221	31,340	-12,096	4,006
coot	4,158	3,234	447,216	462	Tr.	1,386	3,696	
Canada Geese	131,385	5,255	935,461	52,554	99,853	5,255		Tr.
Whistling Swan	278,183	202,536	1,422,637	244,020	190,336	58,565		
Total Waterfowl	609,485	293,142	3,092,674	403,839	453,410	96,546	15,792	4,006
Percent:	12.2	5.8	61.7	8.1	9.0	1.9	0.3	0.1

Table \_\_\_\_\_. (Cont'd) Estimated Consumption (Pounds Dry Weight) of Major Submerged Aquatic Plants by Waterfowl on Back Bay, Virginia, and Currituck Sound, North Carolina, During the Wintering Period 1961-62.

Species	Sagittaria subulata	Potamogeton berchtoldi	Total	Percent
Mallard			6,874	0.1
Black Duck			39,079	0.8
<b>Gadwall</b>			1,938	Tr.
Baldpate		633	292,764	5.8
<b>Pintail</b>		13,259	83,058	1.7
G. W. Teal		82	535	Tr.
<b>Shoveler</b>			235	Tr.
Total Dabbling		13,974	424,483	8.5
Redhead			44,879	0.9
Canvasback			151,339	3.0
Ring-necked Duck		760	127,714	2.5
Gr. & Lr. Scaup		Tr.	11,271	0.2
Bufflehead			198	Tr.
Ruddy Duck			137,546	2.7
American Goldeneye			6	Tr.
Total Diver		760	472,953	9.4
Total Duck		14,734	897,436	17.9
<b>Coot</b>			460,152	9.2
Canada Geese	31,532		1,261,295	25.1
Whistling Swan			2,396,277	47.8
Total Waterfowl	31,532	14,734	5,015,160	
Percent:	0.6	0.3		100.0

Table \_\_\_\_\_, Estimated-Consumption (Pounds Dry Weight) of Major **Submerged Aquatic** Plants by Waterfowl on Back Bay Virginia, and Currituck Sound, North Carolina, During the Wintering Period of 1962-63.

Species	Sago	Wildcelery	Najas	Redheadgrass	Widgeongrass	Chara	Nitella	Dwarf Spikerush
Mallard	5,598	1,469	13,434	2,589	4,128	420		350
Black Duck	41,652	1,680	44,675	6,382	33,590	4,367		2,687
<b>Gadwall</b>	18			91	3,937			
Baldpate	2,981	12,774	171,597	20,013	117,521	426		426
<b>Pintail</b>	25,478	4,383	27,122	4,109	44,107	6,849	Tr.	6,301
G. W. Teal	552	263	289	473	2,156	237	Tr.	4,285
Shoveler		<b>212</b>			<b>568</b>	3		
Total Dabbling	<b>76,279</b>	<b>20,781</b>	<b>257,117</b>	<b>33,657</b>	<b>206,007</b>	<b>12,302</b>	Tr.	<b>14,049</b>
Redhead	26,320		66,295	<b>1,321</b>	16,188			
Canvasback	75,185	159,709	Tr.	151,303	71,449			
Ring-necked Duck	35,722	8,558	6,698	20,342	19,102	1,861		124
<b>Scaup</b>	1,957	485	979	775	455	455		
Ruddy Duck	7,813	8,462	307	3,446	4,708	3,685	Tr.	
Bufflehead	33	39	Tr.	8	50	42		
American Goldeneye				2	12			
Total Diver	<b>147,030</b>	<b>177,253</b>	<b>74,279</b>	<b>177,197</b>	<b>111,964</b>	<b>6,043</b>	Tr.	<b>124</b>
Total Duck	<b>223,309</b>	<b>198,034</b>	<b>331,396</b>	<b>210,854</b>	<b>317,971</b>	<b>18,345</b>	Tr.	<b>14,173</b>
Coot	1,714	1,347	110,304	735	2,204	4,040	Tr.	857
Canada Geese	121,818	33,838	<b>2,470,208</b>	216,566	879,800	74,445	13,535	20,303
Whistling Swan	<b>462,533</b>	<b>336,757</b>	<b>2,365,412</b>	<b>405,731</b>	<b>316,470</b>	<b>97,375</b>		
Total Waterfowl	<b>809,374</b>	<b>564,976</b>	<b>5,277,320</b>	<b>833,886</b>	<b>1,516,445</b>	<b>194,205</b>	<b>13,535</b>	<b>35,333</b>
Percent:	<b>8.7</b>	<b>6.1</b>	<b>56.8</b>	<b>9.0</b>	<b>16.3</b>	<b>2.1</b>	<b>0.1</b>	<b>0.4</b>

Table \_\_\_\_\_, (Cont'd) Estimated Consumption (Pounds Dry Weight) of Major Submerged Aquatic Plants by Waterfowl on Back Bay, Virginia, and Currituck Sound, North Carolina, During the Wintering Period of 1962-63.

<b>Species</b>	Sagittaria <b>subulata</b>	Potamogeton <b>berchtoldi</b>	<b>Total</b>	<b>Percent</b>
Mallard		210	28,198	0.3
Black Duck	5,374	3,023	143,430	1.5
<b>Gadwall</b>			4,046	Tr.
Baldpate	852	852	327,442	3.5
<b>Pintail</b>	822	274	119,445	1.3
G. W. Teal	26	105	8,386	0.1
Shoveler			783	Tr.
Total Dabbling	7,074	4,464	631,730	6.8
Redhead			110,124	1.2
Canvasback			457,646	4.9
-Ring-necked Duck		124	92,531	1.0
<b>Scaup</b>	155		5,261	0.1
Ruddy		Tr.	28,421	<b>0.3</b>
Bufflehead		Tr.	172	Tr.
American Goldeneye			14	Tr.
Total Diver	155	124	694,169	7.5
Total Duck	7,229	4,588	<b>1,325,899</b>	14.2
coot	245		121,446	1.3
Canada Geese	33,838		<b>3,864,351</b>	41.6
<b>Whistling Swan</b>			<b>3,984,278</b>	42.9
Total Waterfowl	41,312	4,588	<b>9,295,974</b>	
Percent:	0.4	0.1		100.0

Table \_\_\_\_\_ Estimated Consumption (Pounds Dry Weight) of Major **Submerged Aquatic** Plants by Waterfowl on Back Bay, Virginia, and Currituck Sound, North Carolina, During the Wintering Period 1963-64<sup>1/</sup>.

Species	Sago						Nitella	Dwarf
	Pondweed	Wildcelery	Najas	Redheadgrass	Widgeongrass	Chara		Spikerush
Mallard	1,880	494	4,512	870	1,387	141		24
Black Duck	26,114	1,053	28,010	4,001	21,060			1,685
<b>Gadwall</b>	11			56	2,428			
Baldpate	1,619	6,939	93,214	10,871	63,839	231		231
<b>Pintail</b>	7,180	1,235	7,643	1,158	12,429	1,930	Tr.	
G. W. Teal	743	354	389	637	2,903	319	Tr.	5,770
Shoveler		244			654	4		
Total Dabbling	37,547	10,319	133,768	17,593	104,700	2,625	Tr.	7,710
Redhead	48,374		121,845	2,429	29,753			
Canvasback	77,135	163,852	Tr.	155,228				
Ring-necked Duck	42,221	10,115	7,916	24,042	<del>23,5026</del>	3,372		147
Gr. & Lr. Scaup	11,615	2,875	5,808	4,600	2,703	2,703		
Ruddy Duck	54,227	58,726	2,131	23,917	32,678	25,574		
Total Diver	233,572	235,568	<b>137,700</b>	210,216	161,012	31,649		147
Total Duck	271,119	245,887	271,468	227,809	265,712	34,274	Tr.	7,857
<b>Coot</b>	4,140	3,253	266,426	1,774	5,323	9,758	Tr.	2,070
Canada Geese	83,387	23,163	<b>1,690,899</b>	148,243	602,238	50,959	<b>9,265</b>	13,898
Whistling Swan	318,801	232,110	<b>1,630,360</b>	279,650	218,127	67,116		
Total Waterfowl	677,447	504,413	<b>3,859,153</b>	657,476	<b>1,091,400</b>	162,107	9,265	23,825
Percent:	9.7	7.2	55.0	9.4	15.6	2.3	0.1	0.3

<sup>1/</sup> Based on food habits data of 1962-63.

Table \_\_\_\_\_ (Cont'd) Estimated Consumption (Pounds Dry Weight) of Major Submerged Aquatic Plants by Waterfowl on Back Bay, Virginia, and Currituck Sound, North Carolina, During the Wintering Period 1963-64<sup>1/</sup>.

Species	<i>Sagittaria</i> subulata	Potamogeton berchtoldi	Total	Percent
Mallard		7.1	9,379	0.1
Black Duck	3,370	1,895	87,188	1.2
<b>Gadwall</b>			2,495	Tr.
Baldpate	463		177,407	2.5
<b>Pintail</b>	232	.77	31,884	0.5
G. W. Teal	35	142	11,292	0.2
Shoveler			-902	Tr.
Total Dabbler	<b>4,100</b>	2,185	320,547	A.6
Redhead			202,401	2.9
Canvasback			469,517	6.7
Ring-necked Duck	Tr.	586	110,975	1.6
<b>Gr. &amp; Lr. Scaup</b>	920	Tr.	31,224	0.4
Ruddy Duck		Tr.	197,253	2.8
Total Diver	920	586	<b>1,011,370</b>	14.4
Total Duck	5,020	2,771	<b>1,331,917</b>	19.0
<b>Coot</b>	591		293,335	4.2
Canada Geese	23,163		<b>2,645,215</b>	<b>37.7</b>
Whistling Swan			<b>2,746,164</b>	39.1
Total Waterfowl	28,774	2,771	<b>7,016,631</b>	
Percent:	0.4	Tr.		100.0

<sup>1/</sup> Based on food habits data of 1962-63.

percent and 15 percent in 1958 and 1959, respectively, to only 0.3 percent of the total aquatic supply in 1963. As it declined the percentage consumption of the standing crop increased. The relationship of use and supply indicates an avoidance of Nitella spp. in the waterfowl diet.

The small quantities of Eleocharis parvula in 1958, and of Sagittaria subulata in 1958 and 1959, had a high variance of the estimate of the standing crop. These aberrant estimates should be discounted.

From 0.6 to 33.8 percent of the standing crop of dwarf spikerush (Eleocharis parvula) was consumed by waterfowl in the period 1959 through 1963. No preference can be discerned from the use-supply relationships. It was a relatively insignificant part of the aquatic supply and the waterfowl diet.

Sagittaria subulata was consumed in proportion to supply. It also was an insignificant part of the standing crop of aquatics and the waterfowl diet.

#### Waterfowl Use of the Total Standing Crop of Aquatics

The percentage use of the total standing crop of aquatics each year is the most accurate statistic of this nature presented in this discussion, and perhaps the most important. The percentage consumption of the standing crop of all aquatics varied from a low of 17.2 to 32.2 percent, from 1958 to 1963. In 1958, both waterfowl use and the supply of aquatics were low; in 1962, waterfowl use and the supply of aquatics were most abundant.

The interpretation of these data is still theoretical. We do not know what percentage use of the supply should be considered "normal" for waterfowl. Certainly total, or 100 percent, use of the standing crop would not be expected, and it would biologically limit sustained annual yield. Nonavailability of a portion of the standing crop probably exists in all habitats, and would further make total use improbable.

The assumption that percentage use of the food supply should normally be a constant, e.g. 20, 30, or 40, percent does not seem logical. Obviously, it is determined by at least two primary variables, the waterfowl population and the food supply. If the food supply is below a certain minimum, it may not be abundant enough to attract and hold waterfowl on the area, thereby distorting a linear relationship at the lower level. If the food supply is exceedingly abundant, a linear relationship at the upper level would probably not exist because the food supply could potentially exceed the number of waterfowl available to use the habitat.

However, the supply of food does determine the potential capacity of a habitat to winter waterfowl. If the percentage consumption of the standing crop was 17 percent, as it was in 1959, it is logical to conclude that the potential wintering waterfowl population could only have been 6 times as great, and probably much less because of non-availability of some food. It follows that the population in 1962, which

consumed 32.2 percent of the standing crop of aquatics, was at least one-third of a potential wintering waterfowl population having the same species composition and food habits. The waterfowl populations in 1942 and 1943, if they were sustained on the area, either indicate much greater use of the standing crop or much greater production of food, for the waterfowl populations exceeded a million in those 2 years.

### Discussion

This problem of the relationship of the supply of, and demand on, the food supply is of paramount importance to a proper assessment of the area for waterfowl. Is the food supply on the entire area the factor limiting waterfowl use? Commonly that problem is most specifically applied to the food supply from the bay habitat--the submerged aquatics.

As shown in the tables indicating the source of food for each species of waterfowl in the periods 1958-61 and 1962, a large portion of the food supply of the mallard, black duck, **pintail**, green-winged teal, wood duck, shoveler, Canada geese, and greater snow geese is from the marsh or field habitat. For these species it is not logical to assume that the standing crop of submerged aquatics in the bay is the principal factor limiting their use of the area. The food supply of the marshes may be limiting for some of these species, however. Indeed, the marshes could be vastly improved and such improvement would be feasible and most likely to attract greater use by the marsh and field-feeding waterfowl.

Gadwall, baldpate, all of the diving ducks, coot, and whistling swan populations are more directly dependent on the food production of the bay habitat.

The populations of the field and marsh-feeding waterfowl have been those that have remained at the more constant level, as indicated by the mid-winter inventories since 1942. **Pintail** and black duck, both of which **feed** from the bay habitat to a greater extent, are exceptions. The greatest decline in the use of the area has been by many of the waterfowl that feed in the bay habitat--baldpate, the diving ducks, and coot. This decline does not, however, demonstrate inadequate wintering habitat.

The relationships of waterfowl group populations to food supply, disturbance, and the Atlantic Flyway waterfowl populations were presented in earlier discussion of the midwinter inventories.

Local decline in use is possibly of greater concern to hunters than generalized decline in waterfowl use of the entire area. For this reason any assessment of the carrying capacity of the entire waterfowl habitat, or whether food supply is a limiting factor for the entire area, is somewhat superfluous to the interest of the waterfowl hunter. The hunter would surely be satisfied with half the number of waterfowl wintering on the area if habitat conditions were such that more equitable distribution resulted. The studies of vegetation distribution and disturbance factors showed that all segments of the area are not equitable, and problem areas with no food and excessive disturbance do exist.

From a broader viewpoint, realistic assessment of the carrying capacity of Back Bay and Currituck Sound is important for proper consideration of the need for, and type of, habitat management.

Mr. Daniel Janzen, former Director of the Bureau of Sport Fisheries and Wildlife, visited the area in 1959 and expressed concern that we need to improve waterfowl habitats, and our knowledge of how to improve these habitats, because of the greater demands that will be made of them as surrounding habitat is destroyed.

However, "equitable" distribution of waterfowl on a national basis is an objective of the Bureau of Sport Fisheries and Wildlife. It should be realized that the Back Bay-Currituck Sound Area is not independent of the rest of the Atlantic Flyway or nation, and improvement of that habitat, or lack of it, would affect waterfowl abundance elsewhere.

In further consideration of the decline in use of the area by bay-feeding waterfowl, we know drought conditions on the breeding grounds have greatly reduced the habitat and production of redheads, canvasback, coot, and probably baldpate, and others. The importance of these breeding grounds to Back Bay and Currituck Sound is implied in discussion of the banding data.

It is illogical to assume that this nationwide decline in the population of these species would not also reflect itself in the number of waterfowl using Back Bay and Currituck Sound. The whistling swan populations that depend exclusively on the bay habitat, but are relatively free from disturbance of their breeding ground and hunting pressure, have been as abundant in some recent years as they were formerly.

The former, tremendous waterfowl use of Back Bay and Currituck Sound, with its accompanying colorful stories and history, has made it more difficult for the people concerned with this area to accept the reality of general national decline in the waterfowl population.

After fully reflecting on the mathematical model of supply and demand of waterfowl foods in Back Bay and Currituck Sound, and my knowledge of the area, I conclude that in years such as 1958, 1963, and 1964 during the study, and probably periodically before that, the aquatic food supply was an important factor limiting use by certain species of waterfowl.

However, in years of abundant aquatic food supply, e.g. 1959 through 1962, it is more likely that the supply of waterfowl was itself the limiting factor on total use of the entire area. This does not negate the existence of some very real problems of inadequate food supply in most years on certain large portions of the entire area.

Aquatic plant food supply is much more erratic on Back Bay than on Currituck Sound. As shown in Volume I of this report, the aquatic plant production varied from 2 to 100 percent of its potential in the period 1958 to 1964, whereas Currituck Sound only varied from 37 to 69 percent of its potential production.

The annual variability of aquatic plant production could have an intangible effect on the persistence with which migrating and wintering waterfowl return to and stay in this area. Because waterfowl are short lived, migratory patterns and habits could be influenced by a few years of consistently poor food production on their wintering grounds.

The relative paucity of aquatic invertebrates, particularly snails and clams, is probably limiting the use of the area by **scaup**.

The estimates of standing crops are probably maximal, for they represent total weight of roots, stems, leaves, seeds, and tubers. Certain portions of these aquatics, e.g. the stems of redheadgrass, are not readily used by waterfowl. Because of this and some nonavailability of foods, the percentage use of waterfowl foods is probably higher than indicated.

#### Marsh Vegetation in the Waterfowl Food Habits

Although the emphasis of the ~~study~~ study was primarily on the submerged aquatic vegetation, because of its importance and more jeopardous exposure to adverse environmental factors, the marsh vegetation contributed about one-fourth of the food used by waterfowl.

The marsh vegetation was of greatest importance to mallards, black ducks, pintails, green-winged teal, shoveler, and snow geese.

Food consumption of all food items was weighted by populations of each species of waterfowl, estimated individual species consumption, and individual waterfowl species food habits as earlier described. As mentioned, no analysis of the food habits of greater snow geese was attempted, although the food source was shown to be exclusively from the marsh.

In descending order, the 10 most important marsh foods for ducks in the period 1958-61 were: Olney's three-square (Scirpus olneyi), common three-square (Scirpus americanus), water-smartweed (Polygonum punctatum), **sawgrass** (Cladium jamaicense), square-stem spikerush (Eleocharis quadrangulata), wax-myrtle (Myrica cerifera), sedge (Carex spp.), amaranthus (Amaranthus viridis), saltgrass (Distichlis spicata), and southern smartweed (Polygonum densiflorum).

In descending order, the 10 most important marsh foods for ducks in the period 1962-63 were: Olney's three-square, common three-square, saltmarsh bulrush (Scirpus robustus), soft-stem bulrush (Scirpus validus), wild millet (Echinochloa walteri), saltgrass, bay berry (Myrica pennsylvanica), sawgrass, wax-myrtle, and sedge (Cyperus odoratus).

As can be readily discerned, the grasses, e.g. saltgrass, goosegrass (Eleusine indica), sand dune panicum (Panicum amarum), clovers (Trifolium spp.), and bulrushes, were the most important marsh and lowland vegetation for Canada geese.

Bulrushes are normally the most important marsh plants in the area for the majority of ducks; however, smartweeds were locally abundant and very productive. Both plants respond favorably to management by fire, "hogging," disking, etc.

Normally the greatest problem is not one of increasing production much beyond that which naturally occurs under present marsh use; the specific problem is to increase availability of existing, tremendous quantities of marsh foods to ducks.

One method, successfully used by a private landowner in the area, was to attract the greater snow geese to his marsh by paper decoys and marsh burns. The large flocks of 20,000 or more snow geese quickly opened up the marsh and foods were available to ducks.

Marsh impoundments would be feasible in many areas and effective in increasing waterfowl use.

#### Land-use Trends of Agriculture Areas--Currituck County

Waterfowl use of the Back Bay-Currituck Sound Area is not only influenced by the environmental conditions within the aquatic habitat itself, but also by the type of agriculture practiced on the surrounding farmland. Agriculture records on the amounts and types of crops grown in Currituck County, North Carolina, from 1925 to 1961 were obtained from the Crop Reporting Service of the North Carolina and U. S. Department of Agriculture to determine possible changes in farming practices which may have affected the waterfowl utilization of the area.

The amount of land in Currituck County used to produce harvestable crops increased from 21,160 acres in 1926 to a high of 37,170 acres in 1951. The amount of farmland in harvestable crops has been in excess of 30,000 acres since 1939. The increased acreage has been placed primarily into soybeans. Soybeans have also replaced some of the acreage which was taken out of the production of crops such as cotton, tobacco, and sweet potatoes.

The principal crops raised in Currituck County which would be attractive to waterfowl are corn, wheat, oats, and other small grains. The amount of corn has remained fairly constant from 13,000 to 16,000 acres since 1925 with occasional annual variations down to 11,000 to 12,000 acres. Although the corn acreage has remained fairly constant, a change in harvest and land-use practices has caused a reduction in the amount of corn acreage which was available during the waterfowl season. With the change to mechanized-farming since the late 1930's, the farmer has placed the corn acreage, following harvest, into other crops. Prior to the use of the mechanical harvester, the harvest of corn was not completed until late fall and the majority of the acreage remained as stalk-fields until spring. The waste corn which remained in the fields was available to the waterfowl through the season in most of the corn acreage. The land practices resulting from mechanized farming have

TABLE

LAND USE TRENDS FOR CURRITUCK COUNTY, NORTH CAROLINA DURING THE YEARS 1925 TO 1951;  
OBTAINED FROM THE NORTH CAROLINA AND U. S. DEPARTMENT OF AGRICULTURE,  
CROP REPORTING SERVICE, RALEIGH, NORTH CAROLINA

YEAR	CORN	WHEAT	OATS	TOBACCO	COTTEN	SOYBEANS FOR BEANS	PEANUTS	LESPEDEZA FOR SEED	IRISH POTATOES	SWEET POTATOES	HAY**	TOTAL
1925	12,970	"	.	10	3,900	4,020	30		†	3,610	†	24,540
1926	11,550	30	50		2,410	3,530	210		†	3,380	†	21,160
1927	15,110	"	20	10	1,500	5,310	100		†	3,550	†	25,600
1928	14,550	5	80	20	2,160	3,590	180		†	2,830	†	23,415
1929	13,520	10	130		3,140	4,820	70		2,280	2,410	†	26,380
1930	12,880	40	150		2,680	3,670	60		2,600	3,440	†	25,520
1931	14,890	40	240		1,330	3,850	30		2,670	2,970	†	26,020
1932	14,710	5	180	"	1,330	2,960	40		1,840	2,900	†	23,965
1933	15,190	30	210		1,420	3,640	10		2,250	2,290	†	25,040
1934	13,960	20	160		1,260	3,700	10		3,060	2,890	†	25,060
1935	14,730	50	210		1,470	4,070	10		2,350	2,520	2,425	27,835
1936	13,790	50	240	--	1,580	3,930	30		1,850	2,580	2,856	26,960
1937	14,430	5	110	2 0	1,930	3,850	10		2,500	3,040	2,088	27,983
1938	14,390	20	140	10	1,190	6,300	10		2,000	2,070	2,527	28,657
1939	14,160	10	130	20	980	9,390	30		2,100	1,850	2,195	30,865
1940	14,790	10	100	8	1,260	8,840	360		2,230	1,550	2,548	31,696
1941	14,240	"	50	10	1,040	9,110	130		1,950	1,540	2,012	30,082
1942	13,640	50	100	5	1,460	11,020	270	10	2,580	1,040	1,756	31,931
1943	13,290	120	60		1,310	11,000	430		3,560	1,320	1,685	32,775
1944	13,500	170	90		1,110	9,700	550	20	2,780	1,330	1,687	30,937
1945	12,220	100	160		680	10,780	910	10	2,690	1,360	1,575	30,485
1946	12,000	120	100		500	12,900	690	20	2,990	1,030	1,101	31,451
1947	11,500	150	50		520	16,200	640	80	2,380	720	1,040	33,280
1948	13,010	120	110	5	650	17,610	470	40	2,780	790	†	35,585
1949	15,750	100	190	5	710	16,400	270	40	1,710	660	683	36,518
1950	14,710	40	420		550	16,670	330	20	2,820	450	800	36,810
1951	15,220	60	140		840	17,220	410	20	1,970	540	750	37,170

\* Information not available.

\*\* Includes lespedeza, soybeans, cowpeas, alfalfa, small grains, and others.

TABLE, \_\_\_\_\_ Land Use Trends for Currituck County, North Carolina During the Years 1952 to 1961; Obtained from the North Carolina and U. S. Departments of Agriculture, Crop Reporting Service, Raleigh, N. C.

	ACRES									
	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961
<u>FARM LAND USES</u>										
All land in Farms	839623	833,716	85,209	84,743	87,625	87,173	87,003	86,338	879399	86,340
Harvested cropland	359985	359739	36,289	36,076	36,152	359499	339819	36,189	359827	33,914
Soil improvement			67	67	134	134	251	33	302	605
Idle cropland	1,802	369	378	407	638	991	1,476	316	459	3,607
Improved pasture	1,303	700	1,428	19377	1,493	1,299	19457	1,314	1,606	19573
Unimproved pasture	816	2,099	330	421	639	696	824	353	188	482
All other land, woods, waste	439717	44,809	46,717	469395	48,569	48,297	49,176	48,133	499017	46,159
<u>MAJOR CROPS HARVESTED</u>										
Corn, all purposes	15,822	15,397	15,584	16,140	16,121	17,536	14,638	16,624	15,697	14,038
Cotton	492	392	322	348	301	206	133	242	254	282
Peanuts, all purposes	237	207	224	222	280	287	256	184	175	240
Wheat for grain	81	61	66	68	173	372	739	2,024	2,886	3,669
Oats for grain	150	151	207	167	218	143	113	193	301	1,056
Other small grain	194	305	541	535	438	260	937	394	676	442
Soybeans	14,796	4,659	159139	4,815	4,635	11,553	139967	159179	15,111	15,168
Lespedeza for seed	15	13	47	75	40	59	88	47	141	263
<u>MINOR CROPS HARVESTED</u>										
Lespedeza	13	4	86	67	191	99	65	50	31	22
Soybeans and cowpeas	730	180	203	201	352	211	42	278	48	46
Small grains	23	107	1	10	60	112	33	29	23	1
Alfalfa and mixtures	23	37	26	25	18	3	21	12	24	21
All other hays	18	61	15	16	20		103	55	36	27
<u>OTHER CROPS AND VEGETABLES</u>										
Irish potatoes for sale	1,859	1,979	1,931	2,448	3,157	3,448	3,226	2,790	2,568	1,802
Sweet potatoes for sale	536	705	512	334	233	194	162	199	262	166
Other vegetables for sale	1,551	1,603	2,294	1,645	1,526	1,633	2,137	2,125	2,199	19337
Vegetable gardens for home use					39	169	201	38	156	291
All other crops	-	-	-	-	-	-	-153	111	14	174

reduced the amount of stalk-fields remaining during the waterfowl season; however, the mechanical harvester leaves much more waste corn in the **fields** than the older harvest methods. There is possibly more waste corn, in fewer fields, available to waterfowl than there was in the era prior to mechanized farming.

The amount of wheat acreage in Currituck County increased sharply after 1956. The wheat acreage ranged from 5 to 173 acres from 1925 to 1956 and increased to 3,669 acres in 1961. The majority of the wheat is grown as winter wheat and is available during the waterfowl season as green forage. The oat acreage also increased sharply in 1961 with 1,056 acres in production. Prior to 1961, the amount of oats ranged from 113 to 301 acres. The amount of other small grains has been erratic, but the trend has been a gradual increase in acreage since 1954.

The available corn acreage is utilized by mallard, black, and wood ducks, and by geese to a **moderate extent** during the waterfowl season. The wheat, oat,, and other small grain acreage receives heavy use by numerous geese, and a few ducks, which use the Back Bay-Currituck Sound Area.

The waterfowl use of the green forage provided by the winter wheat and oats has caused crop damage in some areas, but overall the damage in the area is minor.

1. The changes in the farming and land-use practices resulting from the development of mechanized farming have reduced the amount of corn acreage remaining available in the area through the waterfowl season, but has probably increased the overall total amount of waste corn available to the waterfowl on the reduced acreage.
2. Green forage results from the increase in the amount of wheat, oats, and other small grain in the area since 1956, greatly **enchancing** the overall waterfowl food supply in the area.
3. Overall, the changes in land-use practices in Currituck County during the past decade have provided additional feed for the waterfowl using the Back Bay-Currituck Sound Area.

#### Land-use Trends; Back Bay<sup>1/</sup>

While one of the major influences on the size of the waterfowl population using Back Bay is exerted by the quantity of aquatic vegetation-present, another significant influence is exerted by the crop production in the area. The past and present farm statistics of the area were obtained from the Virginia Department of Agriculture.

The area surrounding Back Bay is almost completely level and is used extensively for agricultural purposes. In this, the Back Bay area deviates from the trends being set for the entire City of Virginia Beach because, while Back Bay has remained agricultural, Virginia Beach has

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<sup>1/</sup> The Back Bay area is located in the City of Virginia Beach but here it is considered as a separate entity.

Table . Land Use Trends in the Area Surrounding Back Bay., Virginia, (Virginia Beach, Virginia) during the Period from 1909 to 1964<sup>1/</sup>

Year	Acreage in Farms	Acreage in Corn	Acreage in Wheat	Acreage in Soybeans	Acreage in Cotton	Acreage in Small Grain.&/	Acreage in All Hay <sup>3/</sup>	Acreage in Potatoes <sup>4/</sup>	Number of Cattle
1909	102,120 <sup>5/</sup>	34,192	30	0	128	42	2,994	4,053	3,004
1919	94,544 <sup>6/</sup>	31,714	49	0	215	297	4,476	5,478	2,793
1924	104,493 <sup>7/</sup>	19,387	179	0	1,959	687	7,343	4,354	3,705
1929	*	20,283	181	0	2,188	538	6,028	4,818	*
1930	90,050	21,800	175	0	740	*	*	*	3,200
1931	*	21,800	220	0	193	*	*	*	3,300
1932	*	21,600	240	0	104	*	*	*	4,000
1933	*	22,000	200	0	180	*	*	*	4,100
1934	*	18,400	220	0	190	496	6,792	7,716	4,100
1935	91,601	20,000	210	0	260	*	*	*	4,200
1936	*	16,600	200	0	300	*	*	*	4,100
1937	*	17,800	210	0	260	*	*	*	4,000
1938	*	17,300	350	0	63	*	*	*	3,800
1939	*	17,000	400	0	93	1,496	5,816	5,416	3,700
1940	87,957	17,000	550	12,000	60	*	*	*	3,760
1941	*	15,800	600	10,000	40	*	*	*	3,900
1942	*	17,100	850	17,200	63	*	*	*	4,000
1943	*	18,300	1,000	14,000	40	*	*	*	4,400
1944	*	19,700	1,530	6,800	60	3,132	3,365	5,974	4,900
1945	93,107	18,000	1,180	8,300	20	*	*	*	5,000
1946	*	16,000	1,220	7,230	30	*	*	*	4,900
1947	*	16,100	2,000	12,950	40	*	*	*	4,900
1948	*	15,400	1,880	15,500	15	*	*	*	4,700
1949	*	15,000	1,650	16,400	10	1,758	2,543	3,393	4,900
1956	92,370	14,100	1,950	16,300	10	*	*	*	5,200
1951	*	14,400	2,150	16,000	20	*	*	*	5,700
1952	*	14,300	1,760	15,800	10	*	*	*	6,100
1953	*	14,200	1,450	15,900	20	*	*	*	6,500
1954	*	14,100	1,200	16,400	5	2,023	2,432	1,773	7,500

Table . Land Use Trends in the Area Surrounding Back Bay, Virginia, (Virginia Beach, Virginia) during the Period from 1909 to 1964<sup>1/</sup>--continued

Year	Acreage in Farms	Acreage in Corn	Acreage in Wheat	Acreage in Soybeans	Acreage in Cotton	Acreage in Small Grains <sup>2/</sup>	Acreage in All Hay <sup>3/</sup>	Acreage in Potatoes <sup>4/</sup>	Number of Cattle
1955	78,531	13,000	1,100	15,900	5	*	*	*	8,300
1956	*	12,000	1,150	19,700	2	*	*	*	8,300
1957	*	12,200	2,300	15,600	2	*	*	*	7,500
1958	*	12,300	2,800	15,900	0	*	*	*	5,000
1959	*	13,100	4,800	14,300	1	1,303	1,574	1,575	5,000
1960	60,383	13,900	4,200	15,800	0	*	*	*	5,000
1961	*	*	5,200	16,500	0	*	*	*	7,000
1962	*	*	3,100	16,100	0	*	*	*	6,200
1963	*	*	3,700	16,200	0	*	*	*	7,000
1964	*	*	4,400	16,000	0	*	*	*	7,200
Trend									
1930-1964: Decrease		Decrease	Increase	Increase	Decrease	Increase	Decrease.	Decrease	Increase

\* No data available.

<sup>1/</sup> There is no data for the years 1910 to 1918, 1920 to 1923, and 1925 to 1928.

<sup>2/</sup> Includes oats, barley, and rye.

<sup>3/</sup> Includes alfalfa, clover, timothy, Lespedeza, and small grains.

<sup>4/</sup> Includes potatoes and sweetpotatoes,

<sup>5/</sup> Based on 1910 data.

<sup>6/</sup> Based on 1920 data,.

<sup>7/</sup> Based on 1925 data.

Figure . Trends in Total Farm Acreage from 1910 to 1960 in The Area Surrounding Back Bay, Virginia.

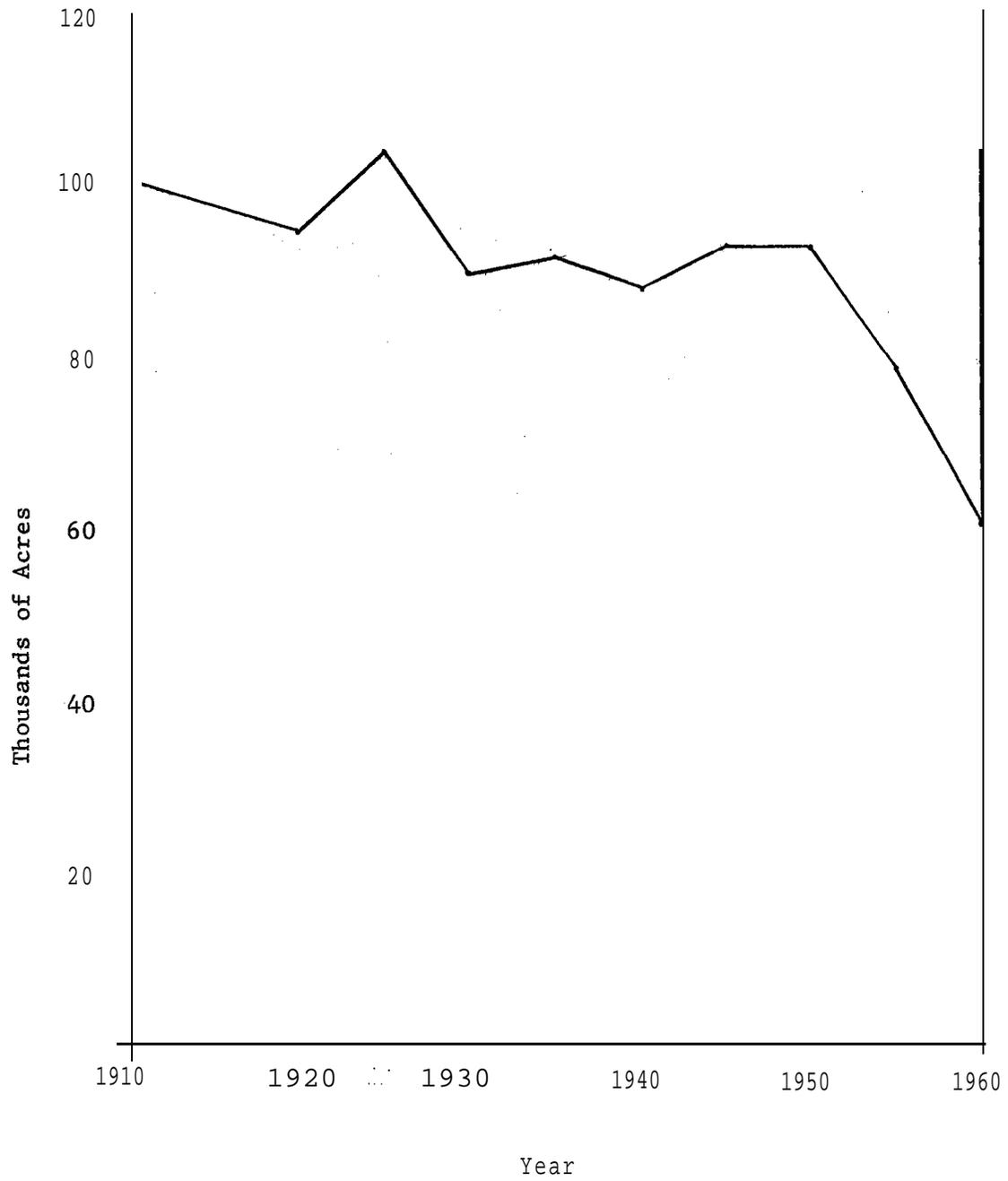


Figure \_\_\_\_\_ Trends in Total Corn, Wheat, and Soybean Acreage Between 1930 and 1964 in The Area Surrounding Back Bay, Virginia.

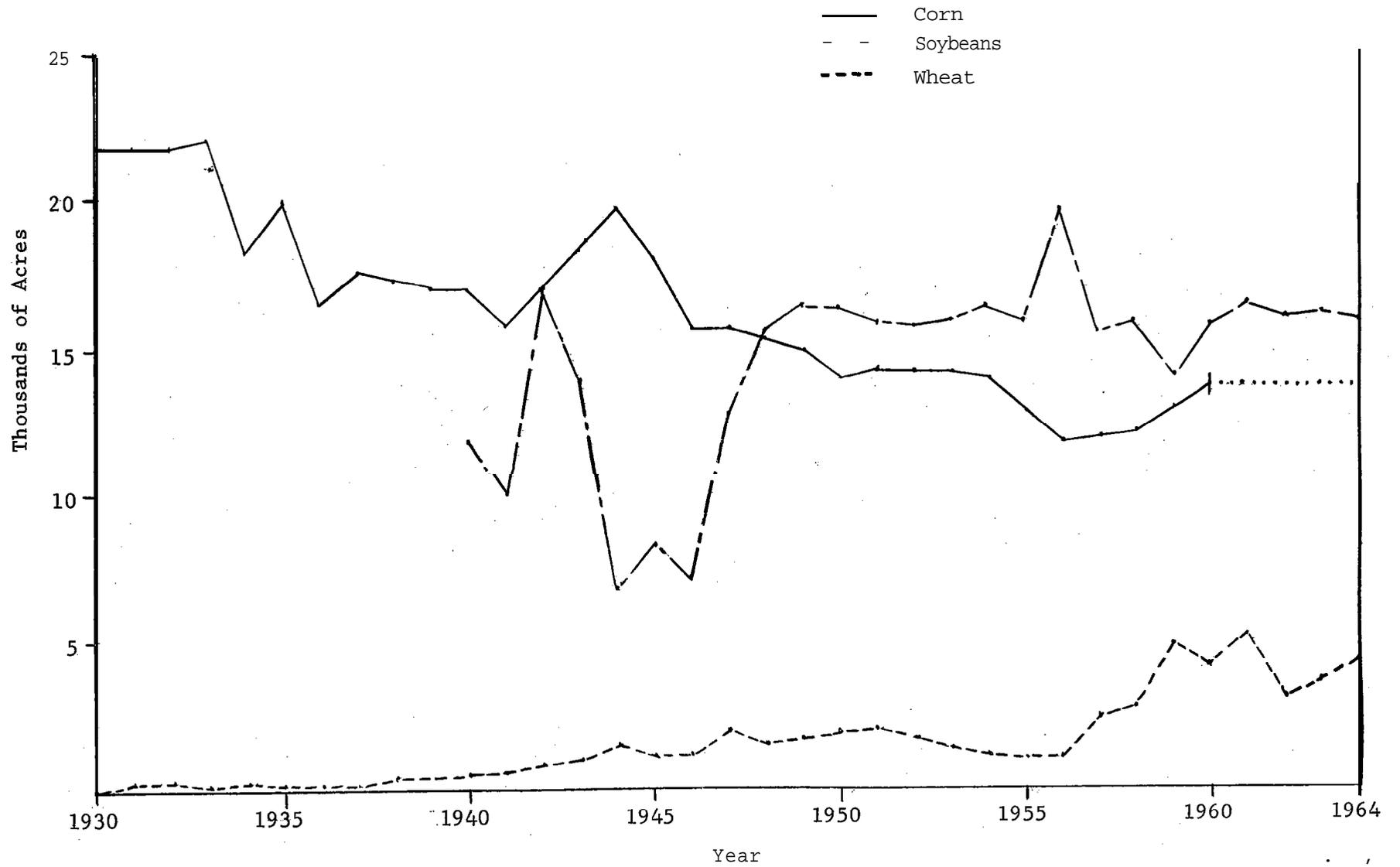


Table . Data Showing the Acreage in Corn, Wheat, and Soybeans as a Percent-of ~~the~~ Total Acreage in Farms in **5-Year** Increments from 1930 to 1960.

Year	Acreage in Farms	Percent in Corn	Percent in Wheat	Percent in Soybeans
1930	90,050	24.2	0.2	0
1935	91,601	21.8	0.2	0
1940	87,957	19.3	0.6	13.6
1945	93,107	19.3	1.3	8.9
1950	92,370	15.3	2.1.	17.6
1955	78,531	16.6	1.4	20.2
1960	60,383	23.0	7.0	26.2

undergone a period of increased urbanization. Thus, the Back Bay area remains relatively unchanged as to total acreage in production.

As mentioned, the Back Bay area has not been measurably affected by the urbanization going on in Virginia Beach; however, in the past 35 years, a number of factors have combined to cause a shift in crop production emphasis in the area. The most **notable factor** influencing the production of crops in the area has been the development of mechanization in farming. With the development of mechanization, the farmers attained the capability of producing two cash crops per year. These are a rotation of soybeans and winter wheat. Even through the use of mechanization, however, a rotation of corn with another crop is difficult due to the late harvest which corn requires. **In recent** years these new developments have caused a large portion of the corn acreage to be turned over to a wheat-soybean rotation. Additional production of crops such as potatoes and small grains will not be considered here because that production is so slight as to be of negligible value.

The soybeans, wheat, and corn produced around Back Bay are all used to some degree by wintering waterfowl. Soybeans, however, prove to be of such slight value to any of the waterfowl that the crop need not be considered. Corn is by far the most valuable crop to waterfowl and is extensively eaten by Canada geese and by ducks, such as **the black, mallard, pintail,** and wood duck to a lesser degree. Wheat also has considerable value as a forage for geese; however, it has almost no value for ducks.

The long-range future of crops in the Back Bay area as a source of food for waterfowl seems to be extremely poor. With the increased efficiency of farmers, a further decrease in corn production is sure to come. Additionally, as Virginia Beach develops into a more pronounced residential and resort complex, a spread of urbanization to the Back Bay region is certain to occur. Practically, this urbanization will mean a large conversion of farmland to housing projects and a resulting loss of any type of valuable crop production.

1. Crop production in the Back Bay area has an influence on the quantity of food available to waterfowl.
2. The Back Bay area has been, and continues to be, a region of agricultural importance.
3. Soybeans, wheat, and corn are the only crops produced in a large enough quantity to be important to waterfowl.
4. Wheat and corn are important sources of food to wintering waterfowl; however, soybeans are unimportant.
5. The future of the Back Bay area as a place of importance in supplying crop foods for waterfowl is regarded as poor due to the increased production of soybeans **and to** the spread of urbanization.

## WATERFOWL BAND RECOVERIES RELATED TO THE BACK BAY-CURRITUCK SOUND AREA

All waterfowl band recoveries on record through January 1961 that related to the Back Bay-Currituck Sound Area were tabulated and mapped by species, age group, location of banding, and location of recovery to 1-minute intervals. Unlike other data in this report, these banding data are permanent, accessible records of the U. S. Fish and Wildlife Service and could be duplicated or obtained as needed. Therefore, these data are not duplicated in this report; maps may be presented in the final publication.

Of the total of **1,656** band recoveries pertaining to the study area, 641 were from bandings in the area and 1,015 were waterfowl banded elsewhere and recovered in the study area. Of the 1,015 recoveries from birds banded elsewhere, 621 were recovered from Currituck Sound and 394 were recovered from Back Bay.

Although there is much of interest in these band recovery data on dates of banding and recovery, location, etc., the major relevance to the scope of the Back Bay-Currituck Sound Study is the documentation of the breeding grounds of the waterfowl species using that area, the intent being to demonstrate the relationship of adverse habitat conditions on the breeding grounds to waterfowl abundance on that wintering ground.

As fundamental as this may seem, its importance is rarely given full consideration.

When the banding **locations** of local (birds out of the nest but unable to fly) mallards are plotted, the relationship to the drought stricken areas of Saskatchewan and Manitoba is apparent. As shown in the accompanying table on local bandings, a significant proportion of mallards using Back Bay and Currituck Sound is from the New England States.

The black duck, of course, is almost exclusively from the Northeast.

Most of the baldpate banded as locals were from Saskatchewan and Manitoba, although two were from Prince Edward Island.

The few **pintail** banded as local and recovered in the study area relate most closely to the Dakotas.

The importance of Manitoba, Saskatchewan, and Minnesota for the production of redhead ducks and canvasback is also demonstrated.

Manitoba and Saskatchewan are important for production of coot, **gadwall**, and other species not well represented in the band recoveries.

As indicated by the band recoveries of ring-necked ducks, the Back Bay-Currituck Sound Area appears to be an important stop in the migration, and not solely a wintering ground. Most of these ring-necked ducks are from eastern United States and Canada.

Only two Canada geese banded as locals were recovered in the study area and they were from the James Bay area. Recoveries from birds banded in

the study area indicate migration through Maryland and New York in a direct line to the east side of James Bay. A migrational pattern along the coast between Maine and the study area is also indicated for both the northern and southern migration.

Although data for some species are quite meager and this analysis is at best superficial, it could be summarized that the drought conditions of the mid-1930's and late 1950's in Manitoba, Saskatchewan, the Dakota's, and adjacent areas could have been expected to most directly affect production of mallard, **gadwall**, baldpate, blue-winged teal, **pintail**, redhead, **canvas-back**, and coot. Certainly those scaup, ruddy, and others that nest in that region were also affected. Those species, e.g. black duck, wood duck:, green-winged teal, ringneck, and Canada geese, nesting in eastern Canada and United States would not have been adversely affected by the prairie droughts.. Of course, those species such as mallard, scaup, etc., which have a wider breeding range, were less affected than those of limited range.

Band Recoveries on Back Bay, Virginia, and Currituck Sound, North Carolina, of Waterfowl Banded as Locals in Designated Locations; Through Fall 1961.

Location	Mallard	Gadwall	Baldpate	Pintail	Wood Duck	Redhead	Canvasback	Unidentified Scaup	Lesser Scaup	Ringneck	Ruddy Duck	Canada Geese	Coot	Total Waterfowl
Alaska			1					1						2
Alberta			1				1		1					3
California						1								1
Colorado		1												1
Connecticut	2													2
Delaware				1										1
Maine					1					1				2
Manitoba		1	4			2	7							14
Massachusetts				1										1
Michigan						1								1
Minnesota	2		1	1		5	1							10
New York	6					2							1	9
North Dakota				1			2							3
Prince Edward Is.			2							1				3
Saskatchewan	5	1	10	1		4	3						2	26
South Dakota				4		1					1		1	7
Vermont	1													1
Keewatin												2		2
	16	3	19	9	1	16	14	1	1	2	1	2	4	89

Band Recoveries of Waterfowl, of Ages Other than Locals, on Back Bay, Virginia, and Currituck Sound, North Carolina, from Waterfowl Banded Elsewhere, Through Fall 1961.

Location	Mallard	Black	Gadwall	Baldpate	G. W. Teal	B. W. Teal	Pintail	Wood Duck	Shoveler	Redhead	Canvasback	Greater Scaup	Lesser Scaup	Ringneck	Ruddy	Canada Geese	Brant	Swan	Coot	Total Waterfowl	
Ala.				2																2	
Alb.													2								2
Calif.							2														2
Conn.	3	7						1													11
Del.	7	2		12			6							4		4			3		38
Fla.							1						2			2					5
Haiti				1																	1
Ill.	4					1	4												7		16
Ind.	1						1												1		3
Labrador		2			1		2														5
La.	1						4			1	2	1									9
Maine		23						4								48					75
Manitoba	2			10			5			23	1								3		44
Md.	10	3		3			5			26	8	7	9	9		16	1		5		93
Mass.		19					2	3													24
Mich.	5	2		1			5			14	5	5	2			2					41
Minn.					1		3			6					1				1		12
Mo.																2					2
Mont.							1														1
Nebr.				1			1						1								3
N.B.		5			1																6
Newf.					6		1														7
N.H.		2					4									3					9
N.J.	4	7	1	9	1							3							1		26
N.Y.	36	47		3	2	1	10	1	2	14	9	3	3	4		25			1		161
N.Dak.				1			5			1									1		8
Nova Scotia		1																			1
Ohio	1			4			3			1				1					2		12
Ont.	5	29			1		10					1	1			1					48
Pa.	4	5		3			2							1							15
Quebec		9			14		1	1													25
R.I.								1													1
Sask.	1			4						2	2	1							3		13
S.C.										1	3	4	22			2			4		36
S.Dak.							2			1											3
Vt.	-5	18				2	1	3													29
W.Va.	1																				1
Wis.				1						1		1				2			1		6
Wyo.										1											1
Kee-watin																	2				2
N.C.	8	2		2			38			1	2	1	1	1		22			10		87
Va.	3	3		1	4		16			1	1	4				4			3		40
Total	101	186	1	58	31	4	135	14	2	94	33	4	36	44	1	133	2	1	46		926

Band Recoveries of Waterfowl Banded at Back Bay, Virginia, Through Fall 1961.

Location	Ma	ard	Black	Baldpate	G.W.Teal	B.W.Teal	Pintail	Redhead	Canvasback	Lesser Scaup	Ringneck	Canada Geese	Coot	Total
Ala.	1								1					2
Alb.	1													1
Conn.	1											1		2
Cuba							2							2
Del.		3	1	1	1	1	1				1	1		8
Fla.						1	2				7		1	11
Ga.											1			1
Ill.	3								1					4
Iowa									1					1
La.						1			1					2
Maine		1										1		2
Mani- toba	1										1			2
Md.	2	1	1				6	2	19		8	11		50
Mass.		1												1
Mich.	2	1	1				3		1					8
Minn.	2					2	1		6					11
N.B.		4									4	1		9
N.J.	1	1			2		9				1			14
N.Y.	2	3					1	1	1		1	5		14
N.C.	7	11	3			1	14		7	1	23	12	1	80
N.Dak.	3								1					4
Nova Scotia		1									2			3
Ont.	8	9					4		1		12	2		36
Pa.	1	1					4				1	2	2	11
P.E.Is.		1												1
Quebec		9				1	3				10	5		28
Sask.	2					2	1		1					6
S.C.	2	1									1			4
S.Dak.	1								1					2
Tenn.	1													1
Venez- uela						1								1
Vt.		3												3
Va.	22	95	6		3		41		16	1	39	23	5	251
Wis.	1						2		2				1	6
Kee- watin							1							1
Ohio	1						1						1	3
Total	65	146	12		6	9	96	3	60	2	112	64	11	586

Band Recoveries of Waterfowl Banded at Currituck Sound, North Carolina,  
Through Fall 1961.

Location	Mallard	Black	G. W. Teal	B. W. Teal	Pintail	Wood Duck	Redhead	Ringneck	Canada Geese	Coot	Total
Del.			3								3
Fla.					1						1
Mani- toba		1						1			2
M d .		1		2				1			4
Mass.		1									1
<b>Mich.</b>	1		1								2
Minn.								1			1
N.B.			1								1
N.J.		2	1					2		1	6
N.Y.		2									2
N.C.	2	1	2				1	3	1	2	12
Ont.								3			3
<b>P.E.Is.</b>		1									1
Quebec									5		5
Va.	3	1	1			1					6
Wis.	1									1	2
Keewatin									1		1
Total	7	10	9	2	1	1	1	11	7	4	53

## NONHUNTING WATERFOWL MORTALITY

The most frequently observed nonhunting mortality of significance in relation to the species populations was the almost annual loss of 500 to 1,000 greater snow geese in late winter. In most instances autopsy indicated the presence of ingested lead pellets and gizzard worms. Mortality was greatest during periods of severe weather. Recent research at the Patuxent Wildlife Research Center has demonstrated high quantities of lead in the livers and tibias of snow geese that died in the Back Bay-Currituck Sound Area. In at least one instance it is believed that the direct management of a heavily hunted marsh to induce snow geese use, thereby improving conditions for ducks, was the cause of a major die-off.

When north winds lower water levels in parts of the study area, whistling swan are most likely to pick up lead pellets, and in the mid-1950's about 200 swan were reported dying from lead poisoning. During the course of each winter from 1958-64, it was normal to see 15 to 25 sick or dead swan in the area. Lead poisoning was apparently the major cause of this mortality, although aspergillosis was the cause in a few instances, and malicious shooting was the cause in at least five instances near Currituck Courthouse. One swan ingested 72 lead pellets. The occurrences of lead pellets in the gizzards of other waterfowl species are indicated in the food habits tables.

On December 9, 1962, reports indicated a die-off of waterfowl on Lake Holly, just north of Back Bay. Dr. L. N. Locke, et al. published an account of this die-off of about 70 red-breasted mergansers and concluded that the nematode Eustrongylides was the cause. On December 14, two normal-appearing red-breasted mergansers were collected and one was infected by Eustrongylides.

Black-backed gulls were frequently observed attacking the large flocks of coot in Currituck Sound. This source of mortality did not seem significant in the period 1958-64; however, a year or so before the study started it is reported that an abnormally large flock of black-backed gulls were in the area causing heavy mortality on coots.

In the fall of 1960 extensive spraying operations were undertaken to control army worms on soybeans. The dosage of 1 lb. toxaphene and 2 lb. DDT was applied to about 12,000 acres in Princess Anne and Norfolk Counties. On September 20, 1960, I observed an aircraft applying this spray to a soybean field adjacent to the Trogan Gun Club. The aircraft on several occasions made a turn over a penned pond area containing Canada geese and mallards. Two days later I was asked by the landowner to determine the cause of death of about a dozen geese and ducks. Field inspection revealed dead fish in the adjacent canal and a sick, wild blue-winged teal.

On a few occasions sick or dead shore birds covered with oil were found on the beach near the Back Bay National Wildlife Refuge. In one instance several red-throated loons were found dead from oil pollution. Periodically, 30,000 or more red-breasted mergansers

use these offshore waters, particularly in the spring, and the potential for loss of significant numbers certainly exists; however, few observations can be **made in** the area. Oil pollution was not frequently reported in the immediate offshore waters.

Starvation was apparently an important cause of mortality only once in the period 1958-64; and even then it was of relative insignificance to all waterfowl except snow geese, which were suffering from lead poisoning and gizzard worms. During the last two weeks in January 1961, most of Back Bay and Currituck Sound froze solidly and a hail storm iced over the marsh vegetation. A few diving ducks and Canada geese died from apparent starvation, and an estimated 1,000 greater snow geese died from the combination of lead poisoning, gizzard worms, and starvation.

A relatively small mortality of 20-30 birds occurs each winter when snow geese fly into the electric wire along the Knotts Island Causeway.

Malicious shooting of snow geese has taken a toll of 20 snow geese at a time along the Knotts Island Causeway.

Each year a few snow geese are caught in muskrat traps.

In summary, nonhunting mortality was generally insignificant in the Back Bay-Currituck Sound Area.

## REFUGES AND SANCTUARIES

The Back Bay National Wildlife Refuge, established in 1938, contains approximately 4,600 acres of sand **dunes** and marsh. An additional 4,500 acres of water within the boundaries are closed to hunting by Presidential Proclamation.

The Currituck Sound Sanctuary, on the western side of Currituck Sound between Church's Island and Poplar Branch, sets aside roughly 5,000 acres closed to boating and hunting during the waterfowl season. It was established in 1958 by the North Carolina Wildlife Resources Commission in **cooperation with** the county game commission.

The Mackay Island National Wildlife Refuge, established in 1961, contains approximately 6,800 acres, partly in North **Carolina, and** partly in Virginia. It includes all of the Great Marsh west of Corey's Ditch.

Certain private sanctuaries, governed by hunting clubs, have been a part of the waterfowl hunting complex in this area for many years. At times these private areas are hunted and sometimes feeding programs are conducted during the season.

Comparison of the waterfowl days use of each of the 20 subdivisions (waterfowl areas) of Back Bay clearly demonstrates the importance of the Back Bay Refuge and the Currituck Sound Sanctuary in providing freedom from disturbance during the hunting season. This is discussed earlier in the section entitled "Relationship of Waterfowl Use to Disturbance Factors and Food Conditions."

Increased marsh management on the Back Bay National Wildlife Refuge, the **Mackay** Island National Wildlife Refuge, and the Virginia Trogan Gun Club and Pocahantas Waterfowl Management Area should do much to enhance the Back Bay and North Currituck Sound area for dabbling ducks and Canada geese.

As frequently mentioned, the marshes of much of the area are productive of good waterfowl foods but need to be opened up to increase availability to waterfowl. Hunting clubs would be wise to pattern their marsh management after that of the Back Bay National Wildlife Refuge, employing all the tools of impoundments, water control structures, marsh burning, and some sanctuary status on large marshes.

The past and present values of the refuges and sanctuaries in Back Bay and Currituck Sound in providing food and sanctuary for waterfowl have been so obvious that the point will not be belabored. In the future additional areas to provide sanctuary may be required.

APPENDIX

Table \_\_\_\_\_, Midwinter Inventory Data for Back Bay, Virginia, 1937-1965.

Species	2/4/37	2/4/38	1/39	1/18/40	(41)*	1/21/42	1/21/43	i/44	1/23/45	(46)*
Mallard	250	450	400	500		2,000	1,000	500	500	
Black	1,500	500	1,000	2,075		10,000	1,500	2,000	1,000	
<b>Gadwall</b>				100		2,000				
Baldpate	750	2,500	1,500	9,500		10,000	3,500	2,000	800	
<b>Pintail</b>	350	1,175	4,500	3,950		12,000	100	500	1,000	
Greed-winged Teal	200	250	500	675		2,000	2,000	500	1,000	
Blue-winged Teal										
Wood Duck						500				
Shoveler							150			
Total Dabblers:	<u>3,050</u>	<u>4,875</u>	<u>7,900</u>	<u>16,800</u>		<u>38,500</u>	<u>8,250</u>	<u>5,500</u>	<u>4,300</u>	
Redhead	25	1,315	300	7,900		10,000	70,000	500	500	
Canvasback	2,000		7,000	19,300		20,000	150,000	5,000	1,000	
<b>Ringneck</b>				3,700		4,000				
<b>Scaup</b>	250	225	4,000	3,200		10,000	40,000	1,000	500	
Ruddy Duck	1,500	450	2,000	1,150		5,000	10,000	1,000		
Bufflehead				50						
Old Squaw										
Total Divers:	<u>3,875</u>	<u>1,990</u>	<u>13,300</u>	<u>35,300</u>		<u>49,000</u>	<u>270,000</u>	<u>7,500</u>	<u>2,000</u>	
Mergansers										
Total Ducks:	<u>6,925</u>	<u>6,865</u>	<u>21,220</u>	<u>52,100</u>		<u>87,500</u>	<u>278,250</u>	<u>13,000</u>	<u>6,300</u>	
coot	2,000	200	2,000	9,500		8,000	60,000	1,000		
Canada Geese	1,000	2,265	8,000	7,700		8,000	20,000	5,000	2,000	
Snow Geese		2,500		9,500			2,500		18,000	
Swan		25	450	1,500		5,000	2,300	1,500	1,000	
Total Waterfowl	<u>9,925</u>	<u>11,855</u>	<u>31,650</u>	<u>80,300</u>		<u>118,500</u>	<u>363,050</u>	<u>20,500</u>	<u>27,300</u>	

\* Data missing.

Table \_\_\_\_\_ Midwinter Inventory Data for Back Bay, Virginia, 1937-1965--continued.

Species	1/47	(48)*	1/12/49	1/11/50	1/10/51	(52)*	1/12-17/(53)**	1/19/54	1/12/55	1/20/56
Mallard			100		100			150	200	100
Black			2,000	1,400	2,000			1,100	2,000	3,200
<b>Gadwall</b>					200				25	
Baldpate	8,600		600	17,300	26,500			16,000	15,000	18,000
<b>Pintail</b>			600	14,500	1,000			600	1,000	6,750
Green-winged Teal			1,500		100			300	500	500
Blue-winged Teal										
Wood Duck										
Shoveler										
<b>Total Dabblers:</b>	<u>8,600</u>		<u>4,800</u>	<u>33,200</u>	<u>29,900</u>			<u>18,150</u>	<u>18,725</u>	<u>28,550</u>
Redhead	1,200		1,000		20,500			12,000	7,500	6,000
Canvasback	1,900		3,000	7,800	1,200			600	3,000	4,000
<b>Ringneck</b>					1,000			1,500	5,000	200
<b>Scaup</b>	2,300			2,500	4,800			7,700	3,000	500
Ruddy Duck			1,000	13,000	5,000			1,000	4,000	3,000
Bufflehead					100				75	50
Old Squaw										
American Goldeneye					50			150	100	50
<b>Total Divers:</b>	<u>5,400</u>		<u>5,000</u>	<u>23,300</u>	<u>32,650</u>			<u>22,950</u>	<u>22,675</u>	<u>13,800</u>
Mergansers			50		50					100
Unidentified Ducks					500					
<b>Total Ducks:</b>	<u>14,000</u>		<u>9,850</u>	<u>56,500</u>	<u>63,100</u>			<u>41,100</u>	<u>41,400</u>	<u>42,450</u>
coot	1,100		20,000	15,500	16,000			21,500	25,000	24,350
Canada Geese	9,300		4,000	12,000	6,000			3,500	9,000	18,700
Snow Geese	15,400		5,200	5,000			21,000	21,000		45,000
Swan			800	1,255	2,250			1,500	4,000	7,150
Blue Geese										20
<b>Total Waterfowl</b>	<u>39,800</u>		<u>39,850</u>	<u>90,255</u>	<u>87,350</u>		<u>88,600</u>	<u>88,600</u>	<u>79,400</u>	<u>137,670</u>

\* Data missing.

\*\* 1953 State summary refers to 21,000 Snow Geese and a total of 88,600 waterfowl.

Table \_\_\_\_\_ Midwinter Inventory Data for Back Bay, Virginia, 1937-1965--continued.

Species	1/18/57	1/16/58	1/17/59	1/8/60	1/7/61	1/8/62	1/10/63	1/6/64	1/5/65
<b>Mallard</b>	1,222	1,068	25	143	917	200	950	320	524
Black	2,891	2,960	722	1,199	3,040	755	4,190	1,387	1,193
<b>Gadwall</b>		<b>20</b>	3		105	8	285		2
Baldpate	2,780	605	45	10	2,497	890	9,995	35	45
<b>Pintail</b>	1,320	704	3	1,325	1,930	1,605	7,825	705	1,980
Green-winged Teal	1,672	615		233	1,442	2,755	1,395	70	75
Blue-winged Teal									
Wood Duck									
Shoveler		16							
Total Dabblers:	9,885	5,988	798	2,910	9,931	6,213	24,640	2,517	3,819
Redhead	40	<b>180</b>	150			2,000	500		
Canvasback	134		33		2,800	250	<b>5</b>		
<b>Ringneck</b>		25	450		100	5,000	55		10
<b>Scaup</b>	558	42				15			
Ruddy Duck	585	50			370	8,530	10		
Bufflehead	155				15	20	5		
Old Squaw									
American Goldeneye									
Total Divers:	1,472	<b>297</b>	633		3,285	15,815	575		10
Mergansers	223	2				7			
Unidentified Ducks		80							
Total Ducks:	11,580	6,367	1,431	2,910	13,216	22,035	25,215	2,517	3,829
<b>Coot</b>	185	<b>1,280</b>	70		3,350	1,140			
Canada Geese	2,657	3,200	5,291	4,810	22,320	6,305	26,285	2,420	4,560
Snow Geese			18,500	14,300	15,900	35,000	25,010		29,300
Swan	593	1,362	3,431	5,100	9,430	3,940	12,535	78	77
Blue Geese									
Brant			60						
Total Waterfowl	15,015	12,209	28,783	27,120	64,216	68,420	64,035	30,025	37,766

Table \_\_\_\_\_, Midwinter Inventory Data for Currituck Sound, North Carolina, 1942-1965 (Game Management Records)

Species	1/42	1/43	1/17/44	1/46	1/7/47	1/48	1/24/49	1/12/50
Mallard	5,000	2,500	2,700	100	1,000	1,500	255	
Black	18,000	32,100	33,000	200	5,000	6,000	11,000	4,050
<b>Gadwall</b>	<b>14,100</b>	2,300	1,200	200	200	1,000	100	
Baldpate	72,650	66,000	30,000		14,000	500	8,925	10,000
<b>Pintail</b>	<b>44,400</b>	<b>75,000</b>	<b>35,000</b>	<b>300</b>	<b>12,500</b>	<b>10,000</b>	<b>4,050</b>	<b>5,000</b>
Green-winged Teal	2,800	300	1,000		750	500		
Blue-winged Teal		500	200		150			
Wood Duck					125	100		
Shoveler	250	200	50		475	25		
Total Dabblers:	<u>157,200</u>	<u>178,900</u>	<u>103,150</u>	<u>800</u>	<u>34,200</u>	<u>19,625</u>	<u>24,330</u>	<u>19,050</u>
Redhead	273,750	50,000	30,000		19,500		8,202	9,240
Canvasback	285,450	48,900	22,000	200	28,000	35,000	2,250	11,370
<b>Ringneck</b>	<b>18,750</b>	<b>27,000</b>	<b>12,000</b>	<b>25</b>		100	575	
<b>Scaup</b>	<b>29,550</b>	<b>25,000</b>	<b>10,000</b>		<b>3,600</b>	<b>2,000</b>	<b>2,500</b>	
Ruddy Duck	42,250	125,000	50,000	50	11,000	11,000	3,200	3,280
Bufflehead	2,500	2,000	800				1,500	
American Goldeneye	350	500	200		300	400		
Total Divers:	<u>652,600</u>	<u>278,400</u>	<u>125,000</u>	<u>275</u>	<u>62,400</u>	<u>48,500</u>	<u>18,227</u>	<u>23,890</u>
Mergansers								
Unidentified Ducks								
Total Ducks:	<u>809,800</u>	<u>457,300</u>	<u>228,150</u>	<u>1,075</u>	<u>96,600</u>	<u>68,125</u>	<u>42,557</u>	<u>42,940</u>
<b>Coot</b>	<b>133,000</b>	<b>165,000</b>	<b>100,000</b>	<b>5,000</b>	<b>110,000</b>	<b>200,000</b>	<b>150,000</b>	<b>119,000</b>
Canada Geese	50,800	60,000	35,000	700	44,500	50,000	38,200	<b>22,340</b>
Snow Geese	2,300	10,000	6,000			5,000	28,000	19,000
Swan	20,970	12,000	15,000	500	10,000	12,000	2,266	5,265
Blue Geese								
Brant								
Total Waterfowl	<u>1,016,870</u>	<u>704,300</u>	<u>384,150</u>	<u>7,275</u>	<u>261,100</u>	<u>335,125</u>	<u>261,023</u>	<u>208,545</u>

Table \_\_\_\_\_ Midwinter Inventory Data for Currituck Sound, North Carolina, 1942-1965 (Game Management Records)

Species	1/9/51	1/9/52	1/14/53	1/13/54	1/15/55	1/9/56	1/11/57	1/15/58
Mallard	1,500	800	500	1,200	1,600	3,000	1,412	2,450
Black	6,000	5,350	1,000	-2,450	7,500	6,000	1,863	5,450
<b>Gadwall</b>	1,700	675	300	1,200	1,500	2,500	495	1,550
Baldpate	10,500	8,650	3,000	4,300	10,000	17,700	1,930	15,850
<b>Pintail</b>	10,600	7,125	1,000	4,600	6,500	<b>4,500</b>	1,463	7,250
Green-winged Teal	2,000	725	500	175	2,250	3,500	160	1,300
Blue-winged Teal		45						
Wood Duck		2,000	3,000	750	3,500			
Shoveler	100	35	20		25		75	
<b>Total Dabblers:</b>	<b>32,400</b>	<b>25,485</b>	<b>9,320</b>	<b>14,675</b>	<b>32,875</b>	<b>37,200</b>	<b>7,398</b>	<b>33,850</b>
Redhead	4,600	8,000	750		14,500	2,500	18	350
Canvasback	6,500	4,750	3,500	3,950	6,500	9,500	21	1,250
<b>Ringneck</b>	1,500	2,350	500	325	1,000			<b>600</b>
<b>Scaup</b>	5,000	5,000	3,000	750	2,800	1,500	50	950
Ruddy Duck	4,800	10,000	400	900	3,300	900	150	450
Bufflehead		200	100		400		6	225
American Goldeneye								150
<b>Total Divers:</b>	<b>22,400</b>	<b>30,300</b>	<b>8,250</b>	<b>5,925</b>	<b>28,500</b>	<b>14,400</b>	<b>245</b>	<b>3,975</b>
Mergansers		1,575	250		500			
Unidentified Ducks								
<b>Total Ducks:</b>	<b>54,800</b>	<b>57,360</b>	<b>17,820</b>	<b>20,600</b>	<b>61,875</b>	<b>51,600</b>	<b>7,643</b>	<b>37,825</b>
<b>Coot</b>	50,000	67,000	30,000	31,000	105,000	52,500	20,285	<b>9,700</b>
Canada Geese	22,000	18,000	6,000	11,000	25,000	22,200	8,500	9,050
Snow Geese	21,000	31,200	20,000	32,000	30,500	21,200	25,000	36,000
Swan	7,500	6,750	3,000	3,600	7,500	10,300	1,885	3,405
Blue Geese					25			
Brant								
<b>Total Waterfowl</b>	<b>155,300</b>	<b>180,310</b>	<b>76,820</b>	<b>98,200</b>	<b>229,900</b>	<b>157,800</b>	<b>63,313</b>	<b>95,980</b>

Table \_\_\_\_\_, Midwinter Inventory Data for Currituck Sound, North Carolina, 1942-1965 (Game Management Records)

Species	1/17/59	1960	1/-/61	1/8/62	1/-/63	1/6-8/64	1/4/65
Mallard	525	1,400	3,500	500	3,400	3,600	1,750
Black	1,215	2,900	1,500	3,200	4,600	5,600	6,150
<b>Gadwall</b>	249	600	200	200	1,000	200	50
Baldpate	685	1,500	7,500	2,000	4,200	7,400	2,400
<b>Pintail</b>	2,042	2,400	1,500	3,000	4,600	1,000	1,050
Green-winged Teal	15	800	2,000	600	2,000		800
Blue-winged Teal							
Wood Duck							
Shoveler					100		
Unidentified Dabblers							2,000
<b>Total Dabblers:</b>	<b>4,731</b>	<b>9,600</b>	<b>16,200</b>	<b>9,500</b>	<b>19,900</b>	<b>17,850</b>	<b>14,200</b>
Redhead	1,647	600	10,500	500	100	10,000	
Canvasback	1,999	1,000	12,000	8,000	600	9,500	17,450
<b>Ringneck</b>	1,942	8,600	7,000	1,000	1,000	1,000	
<b>Scaup</b>	1	2,000	1,000	2,000	200		2,000
Ruddy Duck	140	5,000	600	4,000			
Bufflehead	14	500	100		300		200
American Goldeneye		200					
<b>Total Divers:</b>	<b>5,743</b>	<b>17,900</b>	<b>31,400</b>	<b>15,500</b>	<b>2,700</b>	<b>20,500</b>	<b>19,650</b>
Mergansers		500	200		500		
Unidentified Ducks							
<b>Total Ducks:</b>	<b>10,474</b>	<b>28,000</b>	<b>47,800</b>	<b>25,000</b>	<b>22,600</b>	<b>38,350</b>	<b>33,850</b>
coot	17,350	37,000	45,000	28,000	10,000	21,000	39,500
Canada Geese	14,237	20,000	55,000	20,000	31,000	45,000	28,900
Snow Geese	10,500	25,000	29,000	19,000	47,000	19,000	2,600
Swan	6,398	7,500	15,000	7,500	10,700	22,300	6,200
Blue Geese		2.00					
Brant	885						20
<b>Total Waterfowl</b>	<b>59,844</b>	<b>117,700</b>	<b>191,800</b>	<b>99,500</b>	<b>121,300</b>	<b>145,650</b>	<b>111,070</b>

Table \_\_\_\_\_, Midwinter Inventory Data for Currituck Sound, North Carolina (Sincock's Records),

Species	1/17/59	1/8/60	1/7/61	1/8/62	1/10/63	1/6/64	1/5/65
Mallard	545	456	914	255	1,290	146	1,056
Black	1,235	2,075	1,520	2,975	5,630	2,410	3,080
<b>Gadwall</b>	7		20	15	130	2	8
Baldpate	927	720	2,007	2,275	4,320	7,795	5,675
<b>Pintail</b>	2,040	2,459	751	3,195	12,055	1,495	1,795
Green-winged Teal	15	1,350	20	980	1,280	1,235	1,465
Blue-winged Teal							
Wood Duck						10	
Shoveler					10		
<b>Total Dabblers:</b>	<u>4,769</u>	<u>7,060</u>	<u>5,232</u>	<u>9,695</u>	<u>24,715</u>	<u>13,093</u>	<u>13,079</u>
Redhead	1,647		2,350	900	3,020	12,750	1,810
Canvasback	1,999	1,426	10,610	10,295	16,105	13,370	18,920
<b>Ringneck</b>	1,932	2,000	6,500	1,375	7,305		6,945
<b>Scaup</b>	11	100		2,450	530	1,500	
Ruddy Duck	140	50	4,550	4,500	10	160	215
Bufflehead	14	5	34	19	40		125
American Goldeneye					5		20
<b>Total Divers:</b>	<u>5,743</u>	<u>3,581</u>	<u>24,044</u>	<u>19,539</u>	<u>27,015</u>	<u>27,780</u>	<u>28,035</u>
Mergansers				2		4	
Unidentified Ducks		100					
<b>Total Ducks:</b>	<u>10,512</u>	<u>10,741</u>	<u>29,276</u>	<u>29,236</u>	<u>51,730</u>	<u>40,877</u>	<u>41,114</u>
coot	17,210	20,787	30,740	33,765	8,645	12,340	27,500
Canada Geese	14,017	21,415	36,923	18,550	33,065	20,410	22,392
Snow Geese	10,500	27,200	16,850	7,880	28,000	4,230	5,110
Swan	6,154	9,189	11,011	9,700	22,060	25,087	10,958
Blue Geese							
Brant	885						
<b>Total Waterfowl</b>	<u>59,278</u>	<u>89,332</u>	<u>124,800</u>	<u>99,131</u>	<u>143,500</u>	<u>102,944</u>	<u>107,074</u>

Table \_\_\_\_\_, Combined Midwinter Inventory Data for Back Bay, Virginia and Currituck Sound, North Carolina, 1942-1965

Species	1942	1943	1944--	1947-	1949	1950	(Official Record)			
							1951 -	1953*Totals Only	1954	1955
Mallard	7,000	3,500	3,200	1,000	355		1,600		1,350	1,800
Black	28,000	33,600	35,000	5,000	13,000	5,450	8,000		3,550	9,500
<b>Gadwall</b>	16,100	2,300	1,200	200	100		1,900		1,200	1,525
Baldpate	82,650	69,500	32,000	22,600	9,525	27,300	37,000		20,300	25,000
<b>Pintail</b>	56,400	75,100	35,500	12,500	4,050	19,500	11,600		5,200	7,500
Green-winged Teal	4,800	2,300	1,500	750	1,500		2,100		475	2,750
Blue-winged Teal	500	500	200	150						
Wood Duck				125					750	
Shoveler	250	350	50	475			100			25
<b>Total Dabblers:</b>	<b>195,700</b>	<b>187,150</b>	<b>108,650</b>	<b>42,800</b>	<b>28,530</b>	<b>52,250</b>	<b>62,300</b>		<b>32,825</b>	<b>48,100</b>
Redhead	283,750	120,000	30,500	20,700	9,202	9,240	25,100		12,000	22,000
Canvasback	305,450	198,900	27,000	29,900	5,250	19,170	7,700		4,550	9,500
<b>Ringneck</b>	22,750	27,000	12,000		575		2,500		1,825	6,000
<b>Scaup</b>	39,550	65,000	11,000	5,900	2,500	2,500	9,800		8,450	5,800
Ruddy Duck	47,250	135,000	51,000	11,000	4,200	16,280	9,800		1,900	7,300
Bufflehead	2,500	2,000	800		1,500		100			475
American Goldeneye	350	500	200	300			50		150	100
<b>Total Divers:</b>	<b>701,600</b>	<b>548,400</b>	<b>132,500</b>	<b>67,800</b>	<b>23,227</b>	<b>47,190</b>	<b>55,050</b>		<b>28,875</b>	<b>51,175</b>
Mergansers					50		50			
Unidentified Ducks							500			
<b>Total Ducks:</b>	<b>897,300</b>	<b>735,550</b>	<b>241,150</b>	<b>110,600</b>	<b>51,807</b>	<b>99,440</b>	<b>117,900</b>		<b>61,700</b>	<b>99,275</b>
<b>Coot</b>	<b>141,000</b>	<b>225,000</b>	101,000	<b>111,100</b>	170,000	134,500	66,000		62,500	130,000
Canada Geese	68,800	80,000	40,000	53,800	42,200	34,340	28,000		14,500	34,000
Snow Geese	2,300	12,500	6,000	15,400	33,200	24,000	21,000	<b>41,000*</b>	53,000	30,500
Swan	25,970	14,300	16,500	10,000	3,066	6,520	9,750		5,100	11,500
Blue Geese										
<b>Total Waterfowl</b>	<b>1,135,370</b>	<b>1,067,350</b>	404,650	300,900	300,273	298,800	242,650	165,420-k	196,800	305,275

\*Excludes years where data is missing for one or both areas.

Table \_\_\_\_\_, Combined Midwinter Inventory Data for Back Bay, Virginia and Currituck Sound, North Carolina, 1942-1965  
 --continued

Species	(Official Record)									
	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965
Mallard	3,100	2,634	3,518	550	1,543	4,417	700	4,350	3,970	2,274
Black	9,200	4,722	8,410	1,937	4,099	4,540	3,955	8,790	6,987	7,343
<b>Gadwall</b>	2,500	495	1,570	252	600	305	208	1,285	200	5 2
Baldpate	<b>35,700</b>	4,710	<b>16,455</b>	730	1,510	9,997	2,890	14,195	7,435	2,445
<b>Pintail</b>	11,250	2,783	7,954	2,045	3,725	3,430	4,605	12,425	1,705	3,030
Green-winged Teal	4,000	1,832	1,915	15	1,033	3,442	3,355	3,395	70	875
Blue-winged Teal										
Wood Duck										
Shoveler		75	16					100		
Unidentified <b>Dabbler</b>										2,000
<b>Total Dabblers:</b>	<u>65,750</u>	<u>17,251</u>	<u>39,838</u>	<u>5,529</u>	<u>12,510</u>	<u>26,131</u>	<u>15,713</u>	<u>44,540</u>	<u>20,367</u>	<u>18,019</u>
Redhead	8,500	58	530	1,797	600	10,500	2,500	600	10,000	
Canvasback	13,500	155	1,250	2,032	1,000	14,800	8,250	605	9,500	17,450
<b>Ringneck</b>	200		625	2,392	8,600	7,100	6,000	1,055	1,000	10
<b>Scaup</b>	2,000	608	992	1	2,000	1,000	2,015	200		2,000
Ruddy Duck	3,900	735	500	140	5,000	970	12,530	10		
Bufflehead	50	161	225	14	500	115	20	305		200
American Goldeneye	50		150		200					
<b>Total Divers:</b>	<u>28,200</u>	<u>1,717</u>	<u>4,272</u>	<u>6,376</u>	<u>17,900</u>	<u>34,485</u>	<u>31,315</u>	<u>2,775</u>	<u>20,500</u>	<u>19,660</u>
Mergansers	100	223	2		500	200	7	500		
Unidentified Ducks			80							
<b>Total Ducks:</b>	<u>94,050</u>	<u>19,191</u>	<u>44,192</u>	<u>11,905</u>	<u>30,910</u>	<u>60,816</u>	<u>47,035</u>	<u>47,815</u>	<u>40,867</u>	<u>37,679</u>
coot	76,850	20,470	10,980	17,420	37,000	48,350	29,140	10,000	21,000	39,500
Canada Geese	40,900	11,157	12,250	19,528	24,810	77,320	26,305	57,285	47,420	33,460
Snow Geese	66,200	25,000	36,000	29,000	39,300	44,900	54,000	47,000	44,010	31,900
Swan	17,450	2,478	4,767	9,829	12,600	24,430	11,440	23,235	22,378	6,277
Blue Geese	20				200					
Brant										20
<b>Total Waterfowl</b>	<u>295,470</u>	<u>78,296</u>	<u>108,189</u>	<u>87,682</u>	<u>144,820</u>	<u>255,816</u>	<u>167,920</u>	<u>185,335</u>	<u>175,675</u>	<u>148,836</u>

Table \_\_\_\_\_ Aerial Waterfowl Inventory Data for Currituck Sound, North Carolina, 1950-51.

Species	1950						1951					
	10/3	10/17	10/31	11/14	11/27	12/17	1/9	1/23	2/6	2/23	3/8	3/21
Mallard			34	80	6	140	276		423	85	4	10
Black	141	546	769	1,518	2,690	3,196	3,038	313	3,201	928	500	582
<b>Gadwall</b>		3			250		249		201	86	5	526
Baldpate	130	1,472	6,044	6,060	4,585	1,230	2,460	2,387	3,388	2,166	255	504
<b>Pintail</b>	84	646	2,540	2,791	11,744	5,099	4,567	1,517	5,866	916	155	146
Green-winged Teal				452	370	1,690	960	320	1,756	1,495	375	427
<b>Blue-winged Teal</b>	181	295	25									3
Shoveler			2							20		60
Wood Duck												
Total Dabblers:	536	2,962	9,414	10,901	19,645	11,355	11,550	4,537	14,835	5,696	1,294	2,258
Redhead			18	22	1,395	1,354	1,425	6,745	27,485	6,475	308	2,557
Canvasback				231	448	4,846	8,350	5,601	12,045	1,434	649	449
<b>Ringneck</b>			1,009	120	30					30		749
<b>Scaup</b>		60	795	1,779	4,408	2,017	2,254	1,440	6,898	3,745	1,382	1,454
Bufflehead				7	27	105	153	15	663	12	20	9
American Goldeneye											5	
Surf <b>Scoter</b>			63									
Ruddy			6,829	1,171	4,413	5,651	530	955	9,114	195	47	2,087
Total Divers:	0	60	8,714	3,330	10,721	13,973	12,712	14,756	56,205	11,891	2,411	7,305
Unidentified Duck..	41	97	23	844	6,321	22,743	3,501	645	2,449	1,356	422	333
Redbreasted Merganser			38	13								
Hooded Merganser				75	11							
Total Duck:	577	3,119	18,189	15,163	36,698	48,071	27,763	19,938	73,489	18,943	4,127	9,896
<b>Coot</b>	-30	1,585	43,308	36,136	97,620	93,110	60,280	65,225	66,755	44,520	53,296	66,793
Canada Geese	50	8,638	22,515	24,534	26,264	16,726	20,100	21,673	32,476	22,239	2,253	1,064
Snow Geese							18,000	12,000	200	435		
Blue Geese				1						7		
Whistling Swan				11,030	2,528	3,716	4,684	4,673	3,695	5,475	3,478	10
Total Waterfowl	657	13,342	84,012	86,864	163,110	162,223	130,827	123,509	176,615	91,619	63,154	77,763

Table . Aerial Waterfowl Inventory Data for Currituck Sound, 1951-52.

Species	1951						1952				
	10/2	10/30	11/15	11/25	12/9	12/30	1/9	1/23	2/5	2/19	3/5
Mallard	23	76	105	111	3	157	290	19	18	13	15
Black	179	1,635	1,074	1,052	979	1,469	2,159	186	317	502	404
<b>Gadwall</b>		50	322	93		30	995		67	15	15
Baldpate	15	13,709	4,250	4,775	887	2,338	4,914	1,440	243	1,097	197
<b>Pintail</b>	1,079	11,276	4,915	5,602	2,370	6,041	3,805	4,509	60	445	727
Green-winged Teal	205	2,115	135	2,782	70	520	1,050	550		170	210
Blue-winged Teal	<b>256</b>										21
Shoveler										4	2
Wood Duck											
<b>Total Dabblers:</b>	<b>1,757</b>	<b>28,861</b>	<b>10,801</b>	<b>14,415</b>	<b>4,309</b>	<b>10,555</b>	<b>13,213</b>	<b>6,704</b>	<b>705</b>	<b>2,246</b>	<b>1,591</b>
Redhead			1,543	158	12	455	6,485	16,335	3,905	3,415	800
Canvasback			939	972	868	2,583	6,058	5,051	943	1,319	397
<b>Ringneck</b>		10								70	205
<b>Scaup</b>		222	5,760	1,295	1,257	142	4,480	3,808	1,201	2,375	1,397
Buffl.ehead			8	22	185	126	3			40	
American-Goldeneye					1						
<b>Surf Scoter</b>											
Ruddy		<b>300</b>	<b>2,387</b>	<b>5,425</b>	<b>4,885</b>	<b>1,588</b>	<b>5,975</b>	<b>129</b>	<b>300</b>	<b>248</b>	<b>105</b>
<b>Total Diver:</b>		<b>532</b>	<b>10,637</b>	<b>7,872</b>	<b>7,208</b>	<b>4,894</b>	<b>23,001</b>	<b>25,323</b>	<b>6,349</b>	<b>7,467</b>	<b>2,904</b>
Unidentified Duck:		96	524	1,785	178	423	2,575	185	48	520	272
Redbreasted Merganser									1		16
<b>Total Duck:</b>	<b>1,757</b>	<b>29,489</b>	<b>21,962</b>	<b>24,072</b>	<b>11,695</b>	<b>15,872</b>	<b>38,789</b>	<b>32,212</b>	<b>7,103</b>	<b>10,233,</b>	<b>4,783</b>
coot	183	28,945	57,150	58,500	36,775	52,981	61,000	52,980	39,925	33,740	30,903
Canada Goose	328	29,789	23,892	23,806	13,640	8,620	22,777	8,958	2,546	3,723	3,088
Snow Geese						850	25,000	28,000	25,000	30,000	
Blue Geese											
Whistling 'Swan		<b>2,572</b>	<b>2,652</b>	<b>6,417</b>	<b>2,429</b>	<b>4,359</b>	<b>4,800</b>	<b>2,946</b>	<b>2,491</b>	<b>3,408</b>	<b>2,035</b>
<b>Total Waterfowl</b>	<b>2,268</b>	<b>90,795</b>	<b>105,656</b>	<b>112,795</b>	<b>64,539</b>	<b>82,682</b>	<b>152,366</b>	<b>125,096</b>	<b>77,065</b>	<b>81,104</b>	<b>40,809</b>

Table \_\_\_\_\_ Aerial Waterfowl Inventory Data for Currituck Sound, 1952-53.

Species	1952					1953			
	9/30	10/14	11/14	11/23	12/14	1/14	1/27	2/10	2/27
Mallard	3	37	165	337	525	85	30		8
Black	289	429	2,040	856	1,366	612	965	413	181
<b>Gadwall</b>		160	455	16	175	225	115	78	35
Baldpate	286	5,040	12,895	1,147	1,375	2,792	2,841	379	568
<b>Pintail</b>	39i	1,226	13,180	2,589	<b>5,258</b>	175	267	521	510
Green-winged Teal		70	100	80	663	225	480	120	38
Blue-winged Teal	362	678							
Shoveler									3
Wood Duck									
Total Dabblers:	1,331	7,640	28,835	5,025	9,362	4,114	4,698	1,511	<b>1,343</b>
Redhead		23	1,160	130	595	575	2,100		
Canvasback			27	12	2,643	3,200	4,175	140	118
<b>Ringneck</b>					75	120	1,285	1,400	555
<b>Scaup</b>		8	1,002	740	518	2,812	540	40	168
<b>Bufflehead</b>			6		34	64	12	30	20
American Goldeneye									
Surf Scoter									
Ruddy		<u>515</u>	<u>5,480</u>	<u>2,117</u>	<u>3,415</u>	<u>276</u>			<u>12</u>
Total Diver:		546	7,675	2,999	7,280	7,047	8,112	1,610	873
Unidentified Duck	8	334	730	265	295	351	648	48	135
Redbreasted Merganser					22				7
Total Duck:	1,339	8,520	37,240	8,289	16,959	11,512	13,458	3,169	2,358
Coat	64	7,865	48,730	58,050	25,015	26,810	41,518	38,525	23,170
Canada Geese	537	13,355	45,777	18,424	18,517	3,904	4,901	3,678	2,316
Snow Geese			70		8,500	19,506	30,000	30,000	30,000
Blue Geese									
Whistling Swan			<u>3,043</u>	<u>1,031</u>	<u>2,039</u>	<u>2,523</u>	<u>1,866</u>	<u>2,021</u>	<u>1,533</u>
Total Waterfowl	1,940	29,740	134,860	85,794	71,030	64,255	91,743	77,393	59,377

**Table** \_\_\_\_\_ . Aerial Waterfowl Inventory Data for the Back Bay Area of Virginia, 1958-59, (Includes number of waterfowl observed from Sandbridge Ponds south to Knotts Island Causeway and the Virginia State Line in Knotts Island Channel, and the **North Landing** River in Virginia.)  
**Observer:** John L. Sincock; **Pilots:** Frank Lindsey and Donald L. Cross.

Species	1958:						1959:							
	9/24	10/17	10/29	11/13	11/30	12/7	1/2	1/4	1/11	1/17	1/30	2/19	3/4	3/26
<b>Mallard</b>			140	217	6	174	230	288	70	25	393	107	30	44
Black	52	137	307	472	520	1,292	820	749	336	722	2,221	979	873	674
<b>Gadwall</b>				20			32	407		3	5			
Baldpate	87	785	1,109	1,557	1,101	744	557	3,942	110	154	453	515	315	11835
<b>Pintail</b>	96	250	284	100	29	397	305							
Green W. Teal			25	215	3	10								40
Blue W. Teal	40							19	20				10	1,140
<b>Shoveller</b>				5							3,411	1,228		
Total Dabblers:	275	1,172	1,365	2,586	1,659	2,617	1,944	5,405	690	798			1,066	2,063
Redhead				4										
<b>Canvasback</b>		6	20	15	108	102	3	24	20	150				150
<b>Ringneck</b>			65	1,230		5	110	700	6	33	110	100		
<b>Scaup</b>		10	20	104	140	470	53	6		450	503			
Old Squaw										20	24		45	
A. Scoter						30							10	
<b>Ruddy*</b>			6	45	2	14				400			50	
Total Divers:		22	105	1,453	250	621	166	730	26	633	1,033	124	110	153
Hooded Merganser					2			4						
<b>Unident. Duck</b>		10				50						115		
oot Canada Geese			6,115	3,160	1,900	1,400	340	295	200	70	50			35
Snow Geese	10,199		4,617	5,093	7,516		4,390	9,635	4,805	5,2915,83778	1,681	1,340	70	
			35	1,200	5,000	5,700	18,300	15,030	25,500	18,500		12,000	3,500	
A. Brant		31			25	300				60				
<b>W. swan</b>	3			4,108	1,819	2,266	303	1,068	2,659	3,431	840	628	316	
Total														
Waterfowl:	278	11,434	3,315	13,129	15,740	20,468	26,143	32,137	33,880	28,783	23,942	3,776	14,867	10,787

\*Included with divers.



Table. Aerial Waterfowl Inventory Data for the Back Bay Area of Virginia, 1959-60. (Tabulation includes the number of waterfowl observed from Sandbridge Ponds south to Knotts Island Causeway and the Virginia State Line in Knotts Island Channel. Also included is the North Landing River Area in Virginia).  
Pilot and Observer: John L, Sinecock.

Species	Date: 1960									
	1/2	1/3	1/8	1/9	1/17	2/3	2/12	3/13	3/28	4/8
Mallard	361	204	143	733	315	191	265	65	28	10
Black	1,597	452	1,199	1,913	659	801	1,587	1,108	325	176
Gadwall	37	5					40	22	1	30
Baldpate	616	20	10	240	70	220	50	404	177	
Pintail	930	559	1,325	2,160	2,603	1,736	1,570	2,888	830	
G. W. Teal	800	426	233	990	200	45	75	255	55	
B. W. Teal								50	738	55
Shoveller					10		10		3	
Wood Duck										
Unident. Duck	100									
Total Dabblers:	4,441	1,666	2,910	6,039	3,354	2,993	3,597	4,792	2,157	271
old squaw										
Redhead										
Canvasback	132			6	20	25				
Ringneck	50			60		20		40	3	2
Scaup								35	20	1
Am. Goldeneye	3							12		
Ruddy*					150					3.2
Bufflehead										
Total Divers:	135			66	170	45		87	23	15
Am. Merganser								9	122	
Hooded Merganser	2									
coot	50	65								5
Canada Geese	15,213	14,445	4,810	6,103	4,340	4,395	2,760	2,145	32	75
Snow Geese	21,350	19,200	14,300	23,500	22,510	25,900	20,800	11,850	10,000	2,500
W. swan	6,025	7,265	5,100	2,386	1,950	1,751	1,340	1,159		
Total										
Waterfowl:	47,271	42,641	27,320	38,099	32,814	35,084	28,497	20,042	12,334	2,866

\*Included with divers.

Table Aerial Waterfowl Inventory Data for the Back Bay Area of Virginia, 1960.

(Includes the number of waterfowl observed from Sandbridge Ponds south to Knotts Island Causeway and the Va. State Line in Knotts Island Channel. Also includes the North Landing River Area in Va.)

Species	Date: 1960									
	9/20	10/5	10/19	11/17	11/26	12/3	12/10	12/17	12/31	
Mallard	2		180	462	310	807	1,109	990	1,339	
Black	63	256	380	1,456	1,003	1,896	2,156	1,766	2,782	
Gadwall			10	11	200	20		5	75	
Baldpate	5	2,395	4,510	4,805	3,050	1,376	1,360	1,535	2,732	
Pintail	42	399	814	620	835	932	1,429	1,815	3,803	
G. W. Teal		136	150	290	200	380	635	40	132	
B. W. Teal	153	5	20							
Shoveller	1		5		2					
Wood Duck	1							20	2	
Unid. Dabblers										
Total Dabblers:	<u>267</u>	<u>3,191</u>	<u>6,069</u>	<u>7,644</u>	<u>5,600</u>	<u>5,411</u>	<u>6,689</u>	<u>6,171</u>	<u>10,865</u>	
old Squaw										
Redhead				45	60	250				
Canvasback				470	345	1,470				
Ringneck	5			8,325	9,250	800	1,580	655	45	
Scaup		40								
A. Goldeneye										
Ruddy					2,090	9,213	20		120	
Bufflehead							1		2	
Total Divers:	<u>5</u>	<u>40</u>	<u>—</u>	<u>8,840</u>	<u>11,745</u>	<u>11,733</u>	<u>1,601</u>	<u>655</u>	<u>167</u>	
Scooter										
Am. Merganser										
Hooded Merganser				2		10				
Total Ducks:	<u>272</u>	<u>3,231</u>	<u>6,069</u>	<u>16,486</u>	<u>17,345</u>	<u>17,154</u>	<u>8,290</u>	<u>6,826</u>	<u>11,032</u>	
coot		50	697	5,655	12,440	9,835	7,170	2,460	1,990	
Canada Geese		1,605	10,074	16,400	17,800	29,710	19,237	20,220	16,510	
snow Geese					9,000	5,900	9,010	13,500	11,400	
W. swan				3,182	5,650	6,182	9,005	6,378	6,272	
Brant										
Total	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	
<b>Waterfowl:</b>	<u>272</u>	<u>10,886</u>	<u>16,840</u>	<u>41,723</u>	<u>62,235</u>	<u>68,781</u>	<u>52,802</u>	<u>49,384</u>	<u>47,204</u>	

Table, Aerial Waterfowl Inventory Data for the Back Bay Area of Virginia, 1961, (Includes the number of waterfowl observed from Sandbridge Ponds south to Knotts Island Causeway and the Va. State Line in Knotts Island Channel. Also includes the North Landing River Area in Va.)

Species	Dates: 1961					
	1/7	1/18	2/5	2/27	3/18	4/9
Mallard	917	304	1,239	317	17	10
Black	3,040	1,623	5,349	1,152	634	821
Gadwall	105	45	32			
Baldpate	2,497	680	1,048	145	18	17
Pin-tail	1,930	306	1,284	244	8	5
G. W. Teal	1,442	900	14	962	990	55
B. W. Teal					165	1,697
Shoveller				10	20	15
Wood Duck						
Unid. Dabblers						
Total Dabblers:	<u>9,931</u>	<u>3,863</u>	<u>8,966</u>	<u>2,850</u>	<u>1,852</u>	<u>2,620</u>
Old Squaw						
Redhead			40	610		
Canvasback	2,800	1,450	90	520		
Ringneck	100	854	17	825		201
Scaup					3	
A, Goldeneye			5			
Ruddy	370	10	21		10	105
Bufflehead	<u>15</u>					
Total Divers:	<u>3,285</u>	<u>2,314</u>	<u>173</u>	<u>1,955</u>	<u>13</u>	<u>306</u>
Scoter			22			
Am, Morganser			4	3		15
Hooded Morganser		2			5	
Total Ducks:	<u>13,216</u>	<u>6,179</u>	<u>9,165</u>	<u>4,808</u>	<u>1,870</u>	<u>2,941</u>
coot	3,350	1,085	865	1,195	5,440	2,952
Canada Geese	22,320	16,632	5,470	14,665	6,962	330
Snow Geese	15,900	13,050	2,850	19,200	16,800	3,590
W. Swan	9,430	3,227	3,105	5,426	53	3
Brant			2			
Unid. Ducks			10			
Total Waterfowl:	<u>64,216</u>	<u>40,203</u>	<u>21,467</u>	<u>45,2</u>	<u>12</u>	<u>9,816</u>

Table . Aerial Waterfowl Inventory Data for the Back Bay Area of Virginia, 1961-1962.  
 (Tabulation includes the number of waterfowl observed from Sandbridge Ponds south to Knotts Island Causeway and the Virginia State Line in Knotts Island Channel. Also included is the North Landing River Area in Virginia).  
 Pilot and Observer: John L. Sincock.

Species	1961				1962			
	9/23	10/24	11/26	12/18	1/8	2/6	3/16	4/6
Mallard	12	213	761	775	200	87	46	5
Black	158	869	2,589	2,520	755	660	383	209
Gadwall			90	145	8			
Baldpate	780	7,695	7,692	1,217	890	990	625	85
Pintail	980	710	1,400	3,770	1,605	35	100	50
Green-winged Teal		290	550	1,470	2,755	400	278	60
Blue-winged Teal	95	500					1,295	702
Shoveler	5		15				65	36
Wood. Duck	2							5
Total Dabblers:	2,032	10,277	13,097	19,897	6,213	2,172	2,792	1,152
Redhead			420	150	2,000	100		
Canvasback			135	1,800	250	70	217	
Ringneck		5	5,610	5,854	5,000	6,207	611	67
Scaup				500	15		23	10
Bufflehead			30	40	20			
Surf Scoter							10	
Ruddy		75	572	820	8,530	3	30	
Total Divers:		80	6,767	9,164	15,815	6,380	891	77
Hooded Merganser				5	4			
American Merganser			3		3	6		
coot		630	3,690	595	1,140	600	385	
Canada Geese		22,140	18,180	15,265	6,305	3,770	1,493	225
Snow Geese		60	14,800	31,600	35,000	3,600	11,300	700
Whistling Swan		15	7,033	10,915	3,940	3,260	1,766	9
Total Waterfowl	2,032	33,202	63,570	77,441	68,420	19,788	18,627	2,163

Table . Aerial Waterfowl Inventory Data for the Back Bay Area of Virginia, 1962-1963.  
 (Tabulation includes the number of waterfowl observed from Sandbridge Ponds south to Knotts Island Causeway and the Virginia State Line in Knotts Island Channel. Also included is the North Landing River Area in Virginia).  
 Pilot and Observer: John L. **Sincock.**

Species	1962				1963			
	<u>9/19</u>	<u>10/23</u>	<u>11/14</u>	<u>12/13</u>	<u>1/10</u>	<u>2/14</u>	<u>3/12</u>	<u>4/9</u>
Black	217	1,766	2,580	4,660	4,190	2,825	780	294
Mallard	120	412	875	1,500	950	160	75	16
<b>Gadwall</b>	5		75	15	285		35	20
Baldpate	142	17,350	9,310	3,550	9,995	4,145	630	
<b>Pintail</b>	267	432	955	540	7,825	4,095	70	
Blue-winged Teal	290	70					70	470
Green-winged Teal		85	1,095	300	1,395	405	860	40
Shoveler	465	30				10	15	10
Wood Duck	<u>5</u>	<u>20</u>	<u>55</u>	<u>        </u>	<u>        </u>	<u>        </u>	<u>5</u>	<u>        </u>
Total Dabblers:	1,511	20,165	14,945	10,565	24,640	11,640	<b>2,540</b>	850
Redhead			1,550	550	500	3,500	125	
Canvasback		5	4,200	90	5	110		
<b>Ringneck</b>	2	2,743	4,510	1,150	55		395	15
<b>Scaup</b>		200	150	150			10	30
Ruddy Duck		2,750	3,000	30	10		30	170
Bufflehead	<u>        </u>	<u>2</u>	<u>20</u>	<u>        </u>	<u>5</u>	<u>        </u>	<u>5</u>	<u>        </u>
Total Divers:	2	5,700	13,430	1,970	575	3,610	565	215
Red-Breasted Merganser:				100			10	
<b>Coot</b>	6	850	1,420	950		30	120	210
Canada Geese		21,862	25,485	17,935	26,285	13,110	1,320	350
Snow Geese		1	1,400	12,000		30,300	32,994	3,760
Swan		6	3,075	12,460	12,535	6,490	405	4
Blue Geese	<u>        </u>	<u>6</u>	<u>        </u>					
Total Waterfowl	1,519	48,584	59,755	55,980	64,035	65,180	37,960	5,389

Table \_\_\_\_\_, Aerial Waterfowl Inventory Data for the Back Bay Area of Virginia, 1963-64.

Species	1963			1964			
	9/17	10/18	12/5	1/6	3/4	3/13	4/5
Mallard	6	235	6 1 0	320	159	209	10
Black	211	695	5,055	1,387	1,170	1,556	66
<b>Gadwall</b>			5		25	70	10
Baldpate	34	95	35	35	194	235	20
<b>Pintail</b>	150	320	1,000	705	251	447	
Blue-winged Teal	573				30	1	10
Green-winged Teal			2,350	70	2,220	1,352	350
Shoveler	35						
Wood Duck	9						3
<b>Total Dabblers:</b>	<u>1,018</u>	<u>1,345</u>	<u>9,055</u>	<u>2,517</u>	<u>4,049</u>	<u>3,870</u>	<u>469</u>
Redhead							
Canvasback							
<b>Ringneck</b>		1,315	5			120	
<b>Scaup</b>					1		
Ruddy Duck			20				
Bufflehead							
<b>Total Divers:</b>		<u>1,315</u>	<u>25</u>		<u>1</u>	<u>120</u>	
Red-breasted Merganser					2		1
Hooded Merganser					4		
<b>Total Ducks:</b>	<u>1,018</u>	<u>2,660</u>	<u>9,080</u>	<u>2,517</u>	<u>4,056</u>	<u>3,990</u>	<u>470</u>
<b>Coot</b>						50	
Canada Geese		15,386	5,050	2,420	4,445	1,635	340
Snow Geese			10,300	25,010	48,490	52,018	8,700
Swan			20	78	903	43	
<b>Total Waterfowl</b>	<u>1,018</u>	<u>18,046</u>	<u>24,450</u>	<u>30,025</u>	<u>57,894</u>	<u>57,736</u>	<u>9,510</u>

**Table \_\_\_\_\_ Aerial Waterfowl Inventory Data for Currituck Sound, North Carolina, 1954-59. (Includes number of waterfowl observed from Knotts Island Causeway and the Virginia State line in Knotts Island Channel South to Wright Memorial Bridge, and adjoining bays. Observer: John L. Sincock; Pilots: Frank Lindsey and Donald L. Cross**

species	1953:						1959 :						
	9/24	10/17	10/29	11/13	11/30	12/7	1/4	1/11	1/17	1/30	2/19	3/4	3/26
Mallard		10	594	133	1,342	705	735	140	545	533	273	23	21
Black	40	144	61		700	1,313	2,241	2,226	1,235	4,758	2,172	1,320	769
Baldpate	147	16,743	5,445	5,468	3,400	3,997	4,113	11,099	927	172	0,633	398	4,253
Pintail	256	2,093	342	1,540	158	2,154	2,080	2,337	2,040	3,171	1,468	1,303	11
Green	W.		Total	95	180	300	100		15	541	485	432	
Blue W. Teal		73											2,890
wood Duck								1					
Shoveller							50				3		40
Total Dabblers:	516	18,990	6,575	8,691	4,453	9,063	9,415	15,843	4,769	29,810	7,801	7,343	3 6 5
Redhead				1		2,051	1,503	1,790	1,647	3,204		130	
Canvasback		3		59	373	2,085	2,846	1,999		450			18
Ringneck		78		2	130	740	2,225	75	2,607	3,565	915	62	5
Scaup	13	13	5	156	18	4,924	2,010	200	1,932	7,011	116		
Ruddy*	33		1	470	350	1,817		480		140		22	29
Bufflehead						31		51	14			2	
A. Goldeneye							5						
Old Squaw						6		8			2		1
Total Divers:	13	49	84	633	871	12,374	14,575	5,450	5,743	9,820	7,688	671	40
Unident. Duck					180	25		95			120		
coot		20											
Canada	Geese	Geese	4,925	4,437	512,480	14,008	13,672	12,589	11,882	14,017	14,247	15,18,905	3,630
A. Brant				23	40	6,000	7,000		10,500	30,000	25,000	715	1,600
W. Swan		1,152	250	45	4025	347	877	1,135	885	13			2,030
Total			5	1,459		3,698	3,579	4,187	6,154	18,093	6,822	7,709	18
Waterfowl		529	25,136	15,316	42,126	50,379	71,725	60,671	50,126	59,278	174,479	36,123	28,204

"Included with divers.

Table. Aerial Waterfowl Inventory Data for Currituck Sound, North Carolina, 1959-60. (Includes number of waterfowl observed from Knotts Island Causeway and the Virginia State Line in Knotts Island Channel South to the Wright Memorial Bridge and adjoining bays.) Pilot and Observer: John L. Sincock

Date: 1959											
9/octos	9	10/5	10/13	10/30	11/13	11/21	11/22	12/3	12/5	12/20	
Mallard			14	100	88	351	640	1,113	561	265	952
Black		189	100	1,339	1,076	2,583	2,898	2,536	4,139	3,503	4,983
Gadwall				15		52		65	151	210	114
Baldpate		40	2,305	24,158	6,678	12,679	13,705	7,621	4,802	7,332	7,452
Pintail		671	43	33.4	1,336	1,646	2,406	1,760	1,331	370	3,122
G. W. Teal				270		510	130	1,100	400	266	475
B. W. Teal		1	5						10		
Shoveller									3		
Wood Duck		2				10					
Total Dabblers:		903	2,967	26,196	9,178	17,828	19,789	14,545	11,412	12,408	17,100
Old Squaw								5			2
Redhead						302	180	10			
Canvasback						2,140	1,255	498	1,300	750	
Ringneck			2	50	65	8,900	7,800	5,469	3,170	3,530	
Scaup					220			4,003	100	5	
Am Goldeneye											
Ruddy*					160	760	6,700	2,002	60	11	
Bufflehead								60	21	100	
Total Divers:				2	50	1,145	12,702	15,940	12,042	9,651	4,458
Hooded Merganser								7			
Unident. Duck **						7		15	162	2	
Coot		40	28	2,315	10,015	10,455	18,650	12,350	20,135	16,632	20,170
Canada Geese		372	2,413	17,765	31,212	34,371	38,998	18,680	16,851	28,390	15,566
Snow Geese						4,000	2,200	9,400	2,250		11,000
A. Brant				7							
W. Swan				51	436	10,133	8,190	7,885	7,196	7,942	6,076
Blue Geese:											
Total											
Waterfowl:		1,315	5,408	46,336	50,891	77,932	100,529	78,807	69,886	75,023	76,370

\*Included with divers.

\*\*Included with Dabblers.

**Table**     , **Aerial Waterfowl Inventory Data for Currituck Sound, North Carolina 1960.** (Includes number of waterfowl observed from Knotts Island Causeway and the Virginia State Line in Knotts Island Channel South to the **Wright Memorial Bridge** and adjoining bays.) Pilot and Observer: **John L. Sincock**

Species	Dates: 1960									
	1/2	1/3	1/8	1/9	1/17	2/3	2/12	3/13	3/2	4/8
Mallard	681	230	456	237	190	161	99	68	24	
Black	3,989	2,350	2,075	2,005	1,155	1,281	900	3,876	397	61
Cadwall				15	20	32	15	55	28	130
Baldpate	176	810	720	1,679	1,815	4,107	711	1,544	550	6
Pintail	2,590	481	2,459	1,086	2,395	1,825	2,040	3,989	3	61
G. W. Teal	362	900	1,350	1,070	1,550	780	185	736	70	20
B. W. Teal								435	2,575	205
Shoveller								45	200	112
Wood Duck		1								
<b>Total Dabblers:</b>	<b>7,798</b>	<b>4,872</b>	<b>7,156</b>	<b>6,092</b>	<b>7,125</b>	<b>8,186</b>	<b>3,960</b>	<b>10,751</b>	<b>3,847</b>	<b>595</b>
<b>Old Squaw</b>								10	4	
Redhead	100	200			2,500	2,900	2,150	240		
Canvasback	1,600	3,160	1,426	1,270	3,890	1,320	720	510	1,349	1
Ringneck	7,980	8,980	2,000	761	7,740	20	888	775	320	
Scaup			100			1		90	431	
Am. Goldeneye	2							16	2	
Ruddy*	20,000	3,000	50	100	1,500		700	113	1,001	
Bufflehead			5	2	3	20			28	
<b>Total Divers:</b>	<b>29,682</b>	<b>15,340</b>	<b>3,581</b>	<b>2,134</b>	<b>15,633</b>	<b>4,261</b>	<b>4,458</b>	<b>1,754</b>	<b>3,135</b>	<b>1</b>
Hooded Merganser				3						
Unident. Duck **		100	100				10	3		
coot	16,853	11,470	20,787	25,950	11,260	29,930	19,510	10,600	11,995	5,620
Canada Goose	52,765	34,505	21,415	18,870	21,830	24,939	8,205	5,000	632	95
snow Goose:	9,000	14,300	27,200	13,080	7,500	16,800	1,200	11,600	8,600	3,400
W. swan	21,721	8,535	9,189	7,688	15,045	13,157	8,933	6,906	87	
Blue Geese:										
<b>Total</b>										
<b>Waterfowl:</b>	<b>137,819</b>	<b>89,022</b>	<b>89,328</b>	<b>73,817</b>	<b>78,393</b>	<b>97,278</b>	<b>46,266</b>	<b>46,611</b>	<b>28,296</b>	<b>9,711</b>

\*Included with Divers.

\*\*Included with Dabblers.

Table. \_\_\_\_\_ Aerial Waterfowl Inventories of Currituck Sound, N. C. 1960. (Includes the number of waterfowl observed from Knotts Island Causeway and the Va. State Line in Knotts Island Channel south to the Wright Memorial Bridge and adjoining bays,)

Species	Dates: 1960								
	9/20	10/5	10/19	11/17	11/26	12/3	12/10	12/17	12/31
Mallard	3	12	142	650	819	859	2,081	2,912	1,680
Black	172	151	408	3,190	5,225	4,161	4,510	5,642	4,927
Gadwall			20	53	35	63	10	21	130
Paldpate	20	1,000	7,245	11,692	10,761	24,150	15,672	11,427	8,150
Pintail	415	503	2,339	1,975	4,190	5,969	4,105	6,890	1,970
G. W. Teal		319	386	566	2,070	1,362	895	335	
B. W. Teal	749	1							
Shoveller	23	20							
Wood Duck									
Unid. Duck									
Total Ducks:	<u>1,382</u>	<u>2,006</u>	<u>11,040</u>	<u>18,126</u>	<u>23,100</u>	<u>37,069</u>	<u>27,273</u>	<u>27,227</u>	<u>16,857</u>
Old Squaw					4				
Redhead				160	50		1,150	11,500	2,150
Canvasback				249		1,930	11,930	5,353	12,970
Ringneck	5			16,875	9,250	12,415	10,295	9,190	9,100
Scaup	2	50		3					10
A. Goldeneye									
Ruddy			3	200	2,660	38,950	4,720	445	310
Bufflehead					18		72	15	42
Total Divers:	<u>7</u>	<u>50</u>	3	<u>17,478</u>	<u>11,982</u>	<u>53,351</u>	<u>28,217</u>	<u>27,303</u>	<u>24,582</u>
Tree Duck			55					10	
A. Merganser									
H. Merganser					5		2		
Total Ducks:	<u>1,389</u>	<u>2,056</u>	<u>11,043</u>	35,601,	<u>35,087</u>	<u>90,420</u>	<u>55,492</u>	<u>54,240</u>	<u>41,439</u>
Coot	2	17	4,915	29,610	50,240	69,950	37,090	34,140	50,080
C. Geese		5,382	26,785	38,605	57,320	72,230	63,460	43,715	52,850
Snow Geese				3,800	6,500	14,500	10,300	16,600	17,520
Swan				15,916	8,585	12,660	11,963	14,174	13,575
Blue Geese		1					1		
Total		<u>1</u>							
Waterfowl:	1.391	7.456	42.798	123.535	157.732	259.760	173.306	167.869	180.524

\* 2 . . . Aerial Waterfowl Inventories of Currituck Sound, N. C., 1961. (Includes number of waterfowl observed from Knotts Island Causeway and the Virginia State Line in Knotts Island Channel South to the Wright Memorial Bridge and adjoining bays.)

Species	Dates: 1961					
	1/7	1/18	2/5	2/27	3/18	4/9
Mallard	914	374	641	39	17	
Black	1,520	4,270	3,674	693	582	116
Gadwall	20	20	207		65	
Baldpate	2,007	10,704	8,646	77	229	1
Pintail	751	910	3,051	65	72	25
G. W. Teal	20	362	335	365	681	50
B. W. Teal					250	2,310
Shoveller						30
Wood Duck				10		
Total Dabblers:	<u>5,232</u>	<u>16,640</u>	<u>16,554</u>	<u>1,249</u>	<u>1,896</u>	<u>2,532</u>
Old Squaw						
Redhead	2,350	7,300	5,750	2,100	1	
Canvasback	10,610	7,100	11,118	500	2,120	
Ringneck	6,500	2,430	3,459	111	220	150
Scaup		32	10		35	50
A. Goldeneye						
Ruddy	4,550		231	10	200	50
Bufflehead	<u>34</u>		<u>80</u>	<u>5</u>		
Total Divers:	24,044	<u>17,342</u>	<u>20,648</u>	<u>2,726</u>	<u>2,576</u>	<u>250</u>
Tree Duck						
A. Merganser			4			
H. Merganser			<u>15</u>			
Total Ducks:	<u>29,276</u>	<u>33,982</u>	<u>37,221</u>	<u>3,975</u>	<u>4,472</u>	<u>2,782</u>
Coot	30,740	11,750	27,122	13,365	19,470	7,610
Canada Geese	36,923	35,040	31,225	3,990	2,705	345
snow Geese:	16,850	27,800	34,740	14,800	32,700	185
Swan	11,011	7,445	12,807	5,891	178	4
Bluo Geese.						
Uniden. Ducks			<u>2 0 0</u>			
Total Waterfowl :	<u>124,800</u>	<u>116,017</u>	<u>143,315</u>	<u>42,021</u>	<u>39,525</u>	<u>10,926</u>

Table . Aerial Waterfowl Inventory Data for Currituck Sound, North Carolina, 1961-62.  
 (Includes number of waterfowl observed from Knotts Island Causeway and the Virginia State line in Knotts Island Channel south to Wright Memorial Bridge, and adjoining bays).  
 Observer: John L. Sincock;

Species	1961				1962			
	9/23	10/24	11/26	12/18	1/8	2/6	3/16	4/6
Mallard	10	312	1,302	1,583	255	186	85	17
Black	464	862	8,936	6,824	2,975	2,265	512	181
Gadwall		20	132	130	15	28	20	
Baldpate	1,360	19,720	12,632	11,401	2,275	7,210	725	23
Pintail	910	2,080	3,960	9,170	3,195	890	157	5
Green-winged Teal		75	545	1,305	980	810	222	
Blue-winged Teal	211	100					820	120
Shoveler	10					10	145	12
Wood Duck	31	60	10					15
Total Dabblers:	2,996	23,229	27,517	30,413	9,695	11,399	2,686	373
Redhead			800	1,350	900	2,200		
Canvasback		20	5,370	4,740	10,295	6,650	750	
Ringneck	8	120	15,545	9,345	1,375	8,673	1,415	75
Scaup				42	2,450	50	50	
Old Squaw								2
Bufflehead			18	3	19	25	30	
American Goldeneye			15					
Ruddy		2,750	29,330	6,042	4,500	10	1,410	
Total Divers:	8	2,890	51,078	21,522	19,539	17,608	3,655	77
Hooded Merganser			10		2			
coot		9,700	40,945	31,102	33,765	25,760	13,795	7,160
Canada Geese		57,725	44,005	50,660	18,550	7,250	2,410	110
Snow Geese			4,700	3,700	7,800	22,010	17,450	2,345
Blue Geese							5	
Whistling Swan			9,345	9,780	9,700	7,965	439	5
Total Waterfowl	3,004	93,544	177,600	147,177	99,051	91,992	40,440	10,070

Table . Aerial Waterfowl Inventory Data for Currituck Sound, North Carolina, 1962-1963. (Includes number of waterfowl observed from Knotts Island Causeway and the Virginia State Line in Knotts Island Channel south to Wright Memorial Bridge, and adjoining bays).

Observer: John L. Sincock.

Species	1962				1963			
	9/19	10/23	11/14	12/13	1/10	2/14	3/12	4/9
Black	270	1,772	5,315	13,190	5,630	2,330	1,130	284
Mallard	69	103	690	3,330	1,290	190	40	8
<b>Gadwall</b>		2	25	-220	130	5		5
Baldpate	455	12,132	<b>13,060</b>	13,530	4,320	5,375	345	55
<b>Pintail</b>	964	1,072	4,390	11,010	12,055	2,740	155	35
Blue-winged Teal	157	50					280	520
Green-winged Teal		414	490	1,070	1,280	2,355	1,435	302
Shoveler	22	20			10		50	15
Wood Duck	19	30	215			15	5	
Total Dabblers	1,956	15,595	24,185	42,350	24,715	13,010	3,440	1,224
Redhead	3		100	360	3,020	4,000	1,770	
Canvasback			1,250	650	16,105	30,900	4,300	
<b>Ringneck</b>	10	65	2,415	2,320	7,305	5,800	45	6
<b>Scaup</b>			15	340	530		270	
Ruddy Duck	1	922	1,100	1,870	10	500	60	150
Bufflehead			15	40	40	35		
American Goldeneye					5			
Total Divers	14	987	4,895	5,580	27,015	41,235	6,445	156
Hooded Merganser:				10				
Red-breasted Merganser:				340				1
<b>Coot</b>	18	3,861	9,900	2,200	8,645	5,600	1,675	1,000
Canada Geese	12	12,205	28,700	71,790	33,065	43,250	1,650	10
Snow Geese			11,500	29,900	28,000	16,450	6,000	170
Swan			5,180	13,015	22,060	16,530	760	
Total Waterfowl	2,000	32,648	84,360	165,185	143,500	136,075	19,970	2,561

Table       . Aerial Waterfowl Inventory Data for Currituck Sound, North Carolina, 1963-64.

Species	1963			1964		
	9/17	10/18	12/5	1/6	3/13	4/5
Mallard	1	272	1,195	146	32	
Black	197	1,291	6,600	2,410	947	220
<del> Gadwall</del>			20	2	377	5
Baldpate	93	18,210	8,715	7,795	71	
<b>Pintail</b>	<b>1,805</b>	2,100	1,310	1,495	118	
Blue-winged Teal	543	150			15	70
Green-winged Teal		150	3,200	1,235	1,029	1,115
Shoveler	70				53	190
Wood Duck	8	10	5	10		
<b>Total Dabblers:</b>	<b>2,717</b>	<b>22,183</b>	<b>21,045</b>	<b>13,093</b>	<b>2,642</b>	<b>1,600</b>
Redhead			160	12,750	6,500	
Canvasback			7,310	13,370	20,160	720
Ringneck	40	415	14,185		4,850	160
Scaup			5,000	1,500	100	20
Ruddy Duck			36,800	160	8,325	110
Bufflehead			80		18	2
<b>Total Divers:</b>	<b>40</b>	<b>415</b>	<b>63,535</b>	<b>27,780</b>	<b>39,953</b>	<b>1,012</b>
Red-breasted Merganser						
Hooded Merganser			5	4		
<b>Total Ducks:</b>	<b>2,575</b>	<b>22,598</b>	<b>84,585</b>	<b>40,877</b>	<b>42,595</b>	<b>2,612</b>
<b>Coot</b>	<b>13</b>	<b>952</b>	<b>26,525</b>	<b>12,340</b>	<b>15,250</b>	<b>5,850</b>
Canada Geese	12	49,020	36,700	20,410	2,699	740
Snow Geese			10,150	4,230	2,451	
Swan			15,075	25,087	495	2
<b>Total Waterfowl</b>	<b>2,782</b>	<b>72,570</b>	<b>173,035</b>	<b>102,944</b>	<b>63,490</b>	<b>9,204</b>



**Table. Aerial Waterfowl Inventory Data for the Back Bay, Va. and Currituck Sound, N. C. Area, 1959-60. (Includes the number of waterfowl observed from Sandbridge Ponds south to Wright Memorial Bridge and adjoining bays.)**

Species	Date: 1959									
	9/19	10/5	10/18	10/31	11/13	11/21	11/22	12/3	12/5	12/20
Mallard	100	84	197	168	751	1,720	2,274	1,510	933	1,619
Black	252	357	1,714	2,190	4,451	7,548	6,124	5,843	5,123	6,897
Gadwall			15		52		65	181	298	140
Baldpate	245	3,521	25,108	12,763	26,836	25,890	23,526	6,196	9,652	8,054
Pin-tail	883	204	590	1,456	2,125	3,136	3,967	1,962	2,322	3,645
G. W. Teal			270	31	620	295	1,395	830	626	1,190
B. W. Teal	11	35			30	3		10		
Shoveller		30						3		
Wood Duck	136					10				
Unident. Duck					76			15	202	2
<b>Total Dabblers:</b>	<b>1,627</b>	<b>4,231</b>	<b>27,894</b>	<b>16,633</b>	<b>35,001</b>	<b>38,602</b>	<b>37,351</b>	<b>16,550</b>	<b>19,148</b>	<b>21,547</b>
Old Squaw							5			11
Redhead						902	180	15		
Canvasback				30	5	2,170	2,255	2,128	2,280	980
Ringneck			182	2,850	6,365	13,750	3,650	7,479	8,320	3,860
Scaup					223			4,020	100	10
fun, Goldeneye										4
Ruddy*				260	170	795	6,733	2,002	60	13
Bufflehead								60	21	107
A. Eider										2
<b>Total Divers:</b>			<b>182</b>	<b>3,140</b>	<b>6,760</b>	<b>17,617</b>	<b>17,823</b>	<b>15,704</b>	<b>10,781</b>	<b>4,987</b>
Am. Merganser										
Hooded Merganser							7			2
coot	40	28	2,565	11,240	12,055	19,820	14,910	20,535	17,382	20,250
Canada Goose	472	2,755	23,755	42,185	58,376	66,121	35,232	22,896	40,635	20,349
Snow Goose					4,600	11,700	13,900	19,250	19,000	33,000
A. Brant			7							
W. Swan										
<b>Total</b>			<b>374</b>	<b>4656</b>	<b>20,496</b>	<b>21,723</b>	<b>23,553</b>	<b>11,364</b>	<b>16,334</b>	<b>0.311</b>
<b>Waterfowl:</b>	<b>2,139</b>	<b>7,014</b>	<b>54,777</b>	<b>89</b>	<b>137,290</b>	<b>175,580</b>	<b>143,076</b>	<b>106,239</b>	<b>123,280</b>	<b>108,446</b>

\*Included with Divers,

Table      Aerial Waterfowl Inventory Data for the Back Bay, Va. and Currituck Sound, N. C. Area, 1959-60.  
 (Includes the number of waterfowl observed from Sandbridge Ponds south to Wright Memorial Bridge and adjoining bays.)

Species	Date: 1960									
	1/2	1/3	1/8	1/9	1/17	2/3	2/12	3/13	3/28	4/8
Mallard	1,042	434	599	970	505	352	364	1,33	52	10
Black	5,586	2,802	3,274	3,918	1,814	2,082	2,487	4,984	722	237
Gadwall	37	5		15	20	32	55	77	29	160
Baldpate	792	830	730	1,919	1,885	4,327	761	1,448	727	6
Pintail	3,520	1,040	3,780	3,249	4,995	3,561	3,610	6,877	833	61
G. W. Teal	1,162	1,326	1,583	2,060	1,750	825	260	991	125	20
B. W. Teal								485	3,313	260
Shoveller					10		10	45	203	112
Wood Duck		1								
Unident. Duck	100	100	100				10	3		
Total Dabblers:	12,239	6,538	10,066	12,131	10,979	11,179	7,557	15,543	6,004	866
Old Squaw								10	4	
Redhead	100	200			2,500	2,900	2,150	240		
Canvas-back	1,732	3,160	1,426	1,276	3,910	1,345	720	510	1,349	1
Ringneck	8,030	8,980	2,000	821	7,740	40	888	815	323	2
Scaup			100			1		125	453	1
Am. Goldeneye	5							28	2	
Ruddy*	20,000	3,000	50	100	1,650		700	113	1,001	12
Bufflehead			5	3	3	20			28	
A. Eider										
Total Divers:	29,867	15,340	3,581	2,200	15,803	4,306	4,458	1,841	3,158	16
Am. Merganser								9	122	
Hooded Merganser	2			3						
coot	16,903	11,535	20,787	25,950	11,260	29,930	19,510	10,600	11,995	5,625
Canada Geese	67,983	48,950	26,225	24,978	26,170	29,334	10,965	7,145	664	170
Snow Geese	30,350	33,500	41,500	36,580	30,000	42,700	22,000	23,450	18,600	5,900
A. Brant										
Blue Geese						5				
W. Swan	27,746	15,800	14,289	10,074	16,995	14,908	10,273	8,065	87	
Total										
Waterfowl:	185,090	131,663	116,448	111,916	111,207	132,362	74,763	66,653	40,630	12,577

\*Included with Divers,

Table. Grand Totnl Waterfowl Survey 1960 of Back Bay, Va and Currituck Sound N. C. (Includes the number of waterfowl observed from Sandbridge Ponds south to Wright Memorial Bridge and adjoining bays,)

Species	Dates: 1960								
	9/20	10/15	10/19	11/17	11/26	12/3	12/10	12/17	12/31
Mallard	5	12	322	1,112	1,129	1,666	3,190	3,902	3,019
Black	235	407	783	4,646	6,225	6,057	6,666	7,403	7,709
Gadwall			30	64	235	88	10	26	205
Baldpate	25	3,395	11,755	16,497	13,811	25,526	17,032	32,962	10,882
Pintail	457	902	3,653	2,595	5,025	6,901	5,534	8,705	55,773
G. W. Teal		455	536	856	2,270	2,242	1,530	375	132
B. W. Teal	902	6	20						
Shoveller	24	20	5		2				
Wood Duck	1							20	2
Unid. Dabblers									
Total Dabblers:	1,649	5,197	17,109	25,770	23,700	42,430	33,962	33,398	27,722
Old Squaw					4				
Rodhead				205	110	250	1,150	11,500	2,150
Canvasback				710	345	3,450	11,980	5,853	12,970
Ringneck	10			25,200	10,500	13,215	11,875	9,845	9,145
Scaup	2	90		3					10
A. Goldeneye									
Ruddy			3	200	4,750	43,163	4,740	445	430
Bufflehead					13		73	15	44
Total Divers:	12	90	3	26,318	23,727	65,084	29,318	27,658	24,749
Tree Duck			55					10	
Scoters									
A. Merganser									
H. Merganser				2	5	10	2		
Total Ducks:	1,661	5,287	17,112	52,090	52,432	107,574	63,782	61,066	52,471
coot	2	67	5,612	35,265	62,680	79,785	44,260	36,600	52,070
Canada Goose		6,987	36,859	55,005	75,120	101,940	82,697	68,935	69,360
Snow Goose				3,800	15,500	20,400	19,310	30,100	28,980
Blue Geese		1							
Swan				19,098	14,235	13,842	21,058	20,552	24,847
Brant									
Total									
Waterfowl:	1,663	12,343	59,638	165,258	219,967	328,541	231,108	217,253	227,728

Table. Grand Total Waterfowl Survey 1961 of Back Bay, Va. and Currituck Sound, N. C. (Includes the number of waterfowl observed from Sandbridge Ponds south to Wright Memorial Bridge and adjoining bays. )

Species	Dates: 1961					
	1/7	1/18	2/5	2/27	3/18	4/9
Mallard	1,831	678	1,880	356	34	10
Black	4,560	5,898	9,023	845	1,216	937
Gadwall	125	65	239		65	
Baldpate	4,504	11,384	9,694	242	80	18
Pintail	2,681	1,216	4,335	309	1,671	130
G. W. Teal	1,462	1,262	349	1,327		
B. W. Teal					415	4,007
Shoveller				10	20	45
Wood Duck				10		
Unid. Dabblers						
Total Dabblers:	<u>15,163</u>	<u>20,603</u>	<u>25,520</u>	<u>4,099</u>	<u>3,748</u>	<u>5,152</u>
Old Squaw						
Redhead	2,350		5,790	2,710	1	
Canvasback	13,410	7,800	11,208	1,020	2,320	
Ringneck	6,600	3,284	3,476	936	220	351
Scaup		12	10		38	50
A. Goldeneye			5			
Ruddy	4,920	8,550	252	10	210	155
Bufflehead	49	10	80	5		
Total Divers:	<u>27,329</u>	<u>19,656</u>	<u>20,821</u>	<u>4,681</u>	<u>2,539</u>	<u>556</u>
Tree Duck						
Scoter			22			
A. Merganser			8	3		15
H. Merganser		2	15		5	
Total Ducks:	<u>42,492</u>	<u>40,261</u>	<u>46,386</u>	<u>8,783</u>	<u>6,342</u>	<u>5,723</u>
coot	34,090	12,835	27,987	14,560	24,910	10,562
Canada Geese	59,243	51,672	36,695	18,655	9,667	675
Snow Geese	32,750	40,880	37,590	34,000	29,500	3,775
Swan	20,441	10,672	35,932	31,317	231	7
Brant			2			
Unident. Ducks			210			
Total Waterfowl:	<u>189,016</u>	<u>156,320</u>	<u>64,782</u>	<u>87,315</u>	<u>70,650</u>	<u>20,742</u>

Table . Aerial Waterfowl Inventory Data for the Back Bay, Virginia - Currituck Sound, North Carolina Area, 1961-62. (Includes number of waterfowl observed from Sandbridge Ponds south to Wright Memorial Bridge and adjoining bays.)

Species	1961				1962			
	9/23	10/24	11/26	12/18	1/8	2/6	3/16	4/6
Mallard	22	525	2,063	2,358	455	273	131	22
Black	622	1,731	11,525	9,344	3,730	2,925	895	390
Gadwall		20	22	175	23	28	20	
Baldpate	2,140	27,415	20,324	12,618	3,165	8,200	1,350	108
Pintail	1,890	2,790	5,360	12,940	4,800	925	257	55
Green-winged Teal		365	1,095	2,735	3,735	1,210	500	60
Blue-winged Teal	306	600					2,115	822
Shoveler	15		15			10	210	48
Wood Duck	33	60	10					20
Total Dabblers:	5,028	33,506	40,614	40,310	15,908	13,571	5,478	1,525
Redhead			1,220	1,500	2,900	2,300		
Canvasback		20	5,505	6,540	10,545	6,720	967	
Ringneck	8	125	21,155	15,199	6,375	14,880	2,026	142
Scaup				542	2,465	50	73	10
Old Squaw								2
Bufflehead			48	43	39	25	30	
American Goldeneye			15					
Surf Scoter							10	
Ruddy		2,825	29,902	6,862	13,030	13	1,440	
Total Divers:	8	2,970	57,845	30,686	35,354	23,988	4,546	154
Hooded Merganser			10	5	6			
American Merganser			3		3	6		
coot		10,330	44,635	31,697	34,905	26,360	14,180	7,160
Canada Geese		79,865	62,185	65,925	24,855	11,020	3,903	335
Snow Geese		60	19,500	35,300	42,800	25,610	28,750	3,045
Blue Geese							5	
Whistling Swan		15	16,378	20,695	13,640	11,225	2,205	14
Total Waterfowl:	5,036	126,746	241,170	224,618	167,471	111,780	59,067	12,233

Table . Aerial Waterfowl Inventory Data for the Back Bay, Virginia-Currituck Sound, North Carolina Area, 1962-63. (Includes number of waterfowl observed from Sandbridge Ponds south to Wright Memorial Bridge and adjoining bays.)

Species	1962				1963			
	<u>9/19</u>	<u>10/23</u>	<u>11/14</u>	<u>12/13</u>	<u>1/10</u>	<u>2/14</u>	<u>3/12</u>	<u>4/9</u>
Black	487	3,538	7,895	17,850	9,820	5,155	1,910	578
Mallard	189	515	1,565	4,830	2,240	350	115	24
<b>Gadwall</b>	5	2	100	235	415	5	35	25
Baldpate	597	28,482	22,370	17,080	14,315	9,520	975	55
<b>Pintail</b>	1,231	1,504	5,345	11,550	19,880	6,835	225	35
Blue-winged Teal	447	120					350	990
Green-winged Teal		499	1,585	1,370	<b>2,675</b>	2,760	2,295	342
Shoveler	487	50			10	10	65	25
Wood Duck	<u>24</u>	<u>50</u>	<u>270</u>	<u>          </u>	<u>          </u>	<u>15</u>	<u>10</u>	<u>          </u>
Total Dabblers:	3,467	35,760	39,130	52,915	49,355	24,650	5,980	2,074
Redhead	3		1,650	910	3,520	7,500	1,895	
Canvasback		5	5,450	740	16,110	31,010	4,390	
<b>Ringneck</b>	12	2,808	6,925	3,470	7,360	5,800	440	21
<b>Scaup</b>		200	165	490	530		280	30
Ruddy Duck	1	3,672	4,100	1,900	20	500	90	320
Bufflehead		2	35	40	45	35	5	
American Goldeneye	<u>          </u>	<u>          </u>	<u>          </u>	<u>          </u>	<u>5</u>	<u>          </u>	<u>          </u>	<u>          </u>
Total Divers:	16	6,687	18,325	7,550	27,590	44,845	7,010	371
Hooded Merganser:				10				
Red-breasted Merganser:				440			10	1
coot	24	4,711	11,320	3,150	8,645	5,630	1,795	1,210
Canada Geese.	12	34,067	54,185	89,725	59,350	56,360	2,970	360
Snow Geese		1	12,900	41,900	28,000	46,750	38,994	3,930
Swan		6	8,255	25,475	34,595	23,020	1,165	4
Blue Geese	<u>          </u>	<u>6</u>	<u>          </u>					
Total Waterfowl	3,519	81,232	144,115	221,165	207,535	201,255	57,930	7,950

Table , Aerial Waterfowl Inventory Data for Back Bay, Virginia, and Currituck Sound, North Carolina, 1963-64

Species	1963			1964		
	9/17	10/18	12/5	1/6	3/13	4/5
Mallard	7	507	1,805	466	241	10
Black	408	1,986	11,655	3,797	2,503	286
<b>Gadwall</b>			25	2	141	15
Baldpate	127	18,305	8,750	7,830	612	20
<b>Pintail</b>	1,955	2,420	2,310	2,200	565	
Blue-winged Teal	1,116	150			16	80
Green-winged Teal		150	5,550	1,305	2,381	1,465
Shoveler	105				53	190
Wood Duck	17	10	5	10		3
<b>Total Dabblers:</b>	<b>3,735</b>	<b>23,528</b>	<b>30,100</b>	<b>15,610</b>	<b>6,512</b>	<b>2,069</b>
Redhead			160	12,750	6,500	
Canvasback			7,310	13,370	20,160	720
<b>Ringneck</b>	40	1,730	14,190		4,970	160
<b>Scaup</b>			5,000	1,500	100	20
Ruddy Duck			36,820	160	8,325	110
Bufflehead			80		18	2
<b>Total Divers:</b>	<b>40</b>	<b>1,730</b>	<b>63,560</b>	<b>27,780</b>	<b>40,073</b>	<b>1,012</b>
Red-breasted Merganser						1
Hooded Merganser			5	4		
<b>Total Ducks:</b>	<b>3,775</b>	<b>25,258</b>	<b>93,665</b>	<b>43,394</b>	<b>46,585</b>	<b>3,082</b>
<b>Coot</b>	13	952	26,525	12,340	15,300	5,850
Canada Geese	12	64,406	41,750	22,830	4,334	1,080
Snow Geese			20,450	29,240	54,469	8,700
Swan			15,095	25,165	538	2
<b>Total Waterfowl</b>	<b>3,800</b>	<b>90,616</b>	<b>197,485</b>	<b>132,969</b>	<b>121,226</b>	<b>18,714</b>

Table     , Pre-Hunting Season Waterfowl Days Utilization of Back Bay, Va. and Currituck Sound, N.C. from September 24, 1958 to November 13, 1958.

Area	Dabbling Duck/Days	Diving Duck/Days	Total Duck/Dam	Canada Geese/Days	Brant/Days	Coot/Days	snow Geese/Days	Swan/Days	Total Waterfowl/Days
1	12		12						12
2	490		490	113					603
3	4,829		4,829	35,100					39,929
4	14,959	7,267	22,226	212,200		12,000	473	398	247,297
5	8,695	75	8,770	7,425		1,822			18,017
6	14,962	1,808	16,770	34,490	625	5,550	9,000	413	66,848
7	62,624	4,463	67,087	7,416	52	6,150		12	80,717
8									
Total Va.	106,571	13,613	120,184	296,744	677	25,522	9,473	823	453,423
9	58,562	91	58,653	35,564		2,055			96,272
10	136,095	3,639	139,734	37,643		23,100		495	200,972
11	11,636		11,636			15			11,651
12	575		575						575
13	698		698	16,043		22		30	16,793
14	70,228	53	70,281	3,850					74,131
15	416		416	2,350		150			2,916
16	176,940	2,295	179,235	43,185	8,623	62,400		8,092	391,535
17		150	150	9,000					9,150
18	76,426	1,325	77,751	41,366	15,115	87,597	188	2,392	224,409
19	12,005	60	12,065	35,692		11,550	23		59,330
20									
Total N.C.	543,581	7,613	551,194	224,693	23,738	186,889	211	11,009	997,734
Grand Total	650,152	21,226	671,378	521,437	24,415	212,411	9,684	11,832	1,451,157

\*See Table on Waterfowl Location Description.

Table     . Hunting Season Waterfowl Days Utilization of Back Bay, Va. and Currituck Sound, N. C. from November 13, 1958 to January 17, 1959.

Area No.*	Dabbling Duck/Days	Diving DDuc/Days	Total Duck/Days	Canada Geese/Days	Brant/Days	Coot/Days	Snow Geese/Days	Swan/Days	Total Waterfowl/Days
1	928		928						928
2	2,891		2,891	3,727				2,001	8,619
3	994	743	1,737	3,830		1,785		2,839	10,191
4	143,243	30,394	173,637	351,509		44,062	262,500	40,070	871,778
5	1,360	120	1,480	5,115				96	6,691
6	16,076	2,890	12,966	34,911		6,290	133,950	22,057	216,174
7	43,566	11,993	55,559	48,918	5,250	27,670	257,250	41,604	436,251
8	<u>1,165</u>	<u>567</u>	<u>1,732</u>	<u>664</u>		<u>175</u>			<u>2,571</u>
Total Va.	210,223	46,707	256,930	448,674	5,250	79,982	653,700	108,667	1,553,203
9	43,560	10,636	54,196	76,369	193	38,885	31,600	13,420	264,663
10	54,640	14,892	69,532	41,491	14,497	59,630	122,500	26,571	334,221
11	32,869	563	33,457	219		17	133,974	960	168,627
12	8,899	15	8,914						8,914
13	5,192	14,606	19,793	30,625	5,460	26	52,500	20,116	323,525
14	878	74,053	74,931	40,470				3,556	118,957
15	3,538	5,650	9,188	30,890	163	215		14,336	54,792
16	31,660	22,065	103,725	107,732	4,965	190,525		67,778	474,725
17	-259	688	957	40,160				5,545	46,662
18	121,266	306,817	428,083	288,717	5,695	744,736	213	77,929	1,545,373
19	85,366	91,558	176,924	187,783		161,627	25	1,391	528,250
20	<u>727</u>	<u>8,720</u>	<u>5,447</u>	<u>855</u>				<u>842</u>	<u>7,144</u>
Total N.C.	438,864	546,288	985,152	845,311	30,973	1,195,661	390,812	232,944	3,680,853
Grand Total	649,087	532,995	1,242,082	1,293,985	36,223	x,275,643	1,044,512	341,611	5,234,056

\*See Table on Waterfowl Location Description.

Table Post-Hunting Season Waterfowl Days Utilization of Back Bay, Va. and Currituck Sound, N. C. from January 17, 1959 to March 26, 1959.

Area No. #	Dabbling Duck/Days	Diving Duck/Days	Total Duck/Days	Canada Geese/Days	Brant/Days	Coot/Days	Snow Geese/Days	Swan/Days	Total Waterfowl/Days
1	902	2,475	3,377						3,377
2	2,369		2,369	17,245				1,668	21,282
3	6,220	12,375	18,495	59,709		1,744		7,620	87,568
4	69,771	7,034	76,805	119,721			58,450	15,298	270,274
5	454	330	784	33,827					34,611
6	26,561	4,331	30,892	70,435	578		276,250	19,725	397,880
7	17,049	325	17,374	6,978	413	165	195,495	7,947	228,372
8	82		82	1,980					2,062
<u>Total Va.</u>	123,308	26,870	150,178	309,895	991	1,909	530,195	52,258	1,045,426
9	20,655	1,118	21,773	26,670		10,560	141,560	6,335	206,838
10	139,326	5,015	144,341	59,755	1,565			23,924	229,585
11	45,490	58	45,548	345				594	46,487
12	2,594	33	2,627			16			2,643
13	16,213	84,900	101,113	33,865			907,500	6,150	1,048,628
14	141,614	25,330	166,944	249,881				118,995	535,820
15	2,232	1,583	3,815	16,570				30,171	50,556
16	129,869	84,001	213,870	278,073	1,042	20,615		203,268	716,868
17	5,156	12,040	17,196	87,785				65,274	170,255
18	326,113	104,269	430,382	258,053	1,756	592,733		97,545	1,380,469
19	7,019	7,475	14,494	51,715		406,330		1,528	474,067
20	3,607	4,113	7,720	1,293	82			3,035	12,130
<u>Total N.C.</u>	839,888	329,935	1,169,823	1,064,005	2,880	1,031,819	1,049,000	556,819	4,874,346
<u>Grand Total</u>	963,196	356,805	1,320,001	1,373,900	3,871	1,033,728	1,579,195	609,077	5,919,772

\*See Table on Waterfowl Location Description.

Table. \_\_\_\_\_ Waterfowl Days Utilization of Back Bay, Va. and Currituck Sound, N. C. Computed from Thirteen Aerial Inventories from September 24, 1958 to March 26, 1959.

Area	Dabbling Duck/Days	Diving Duck/Days	Total Duck/Days	Canada Geese/Days	Brant/Days	Coot/Days	Snow Geese/Days	Swan/Days	Total Waterfowl/Days
1	1,842	2,475	4,317						4,317
3	5,750		5,750	21,085				3,669	30,504
4	11,943	13,137	25,080	98,639		3,530		10,459	137,708
5	227,973	44,694	272,667	683,430		56,062	321,423	55,766	1,389,348
6	10,510	525	11,035	46,367		1,832		96	59,310
	57,599	9,029	66,628	139,836	1,203	11,840	419,200	42,195	681,101
7	126,392	16,780	143,172	63,312	5,735	33,985	452,745	49,563	743,492
8	1,247	567	1,814	2,644	299	175			4,932
Total									
<u>Va.</u>	443,256	87,406	530,662	1,055,313	7,217	107,404	1,193,368	161,748	3,055,712
9	122,777	11,846	134,623	138,603	8,030	51,500	228,100	19,755	580,611
10	330,061	23,545	353,606	138,889	14,497	84,295	122,500	50,990	764,777
11	89,995	645	90,640	564		32	133,974	1,554	226,764
12	12,068	47	12,115			16			12,131
13	22,103	95,063	117,166	80,533	5,460	48	960,000	26,296	1,189,503
14	212,728	99,434	312,162	294,201				122,551	728,914
15	6,186	7,232	13,418	49,810	163	365		44,507	108,263
16	384,469	108,360	492,829	428,990	14,630	273,540		279,138	1,489,127
17	5,425	12,877	18,302	136,945				70,819	226,066
18	523,805	412,409	936,214	588,136	22,566	1,425,066	401	177,866	3,150,249
19	104,380	99,092	203,472	275,190		579,507	48	3,419	1,061,636
20	4,334	8,833	13,167	2,148	32			3 . m	19,274
Total									
<u>N.C.</u>	1,818,331	879,383	2,697,714	2,134,009	65,423	2,414,369	1,445,023	300,772	9,557,315
Grand									
<u>Total</u>	2,261,587	966,789	3,228,376	3,189,322	72,645	2,521,773	2,638,391	962,520	12,613,027

\*See Table on Waterfowl Location Description.

Table. Pre-Hunting Season Waterfowl Days Utilization of Back Bay, Va. and Currituck Sound, N. C. from September 19, 1959 to November 21, 1959.

Area No.*	Dabbling Duck/Days	Diving Duck/Days	Total Duck/Days	Canada Geese/Days	Brant/Days	Coot/Days	Snow Geese/Days	Swan/Days	Waterfowl/Days
1	909		909	552					1,461
2	1,719	3,450	5,169	16,560					21,729
3	752		752	6,650				48	7,459
4	318,363	110,503	428,866	405,019		20,135	22,300	134,368	1,010,688
6	1,284		1,284	7,225					8,509
7	31,203		31,203	99,706		312	14,000	36,990	182,211
8	35,188	2,122	37,310	18,243		15,280	8,000	5,645	84,478
8	1,827		1,827	15,960				4,800	22,587
<u>Total Va.</u>	<u>391,245</u>	<u>116,075</u>	<u>507,320</u>	<u>569,915</u>		<u>35,727</u>	<u>44,300</u>	<u>181,851</u>	<u>1,339,113</u>
9	59,862	600	60,462	19,902		5,823		840	87,027
10	42,012	525	22,537	39,130		8,800	27,400	17,910	134,877
11	7,317		7,317	16,995				945	25,257
12	7,314	105	7,419	11,567					18,986
13	3,039	3,822	6,861	78,786				10,228	95,875
14	864	16,360	17,224	108,200				10,104	135,528
15	2,478	323	2,801	30,506				1,103	34,410
16	222,516	40,700	263,216	157,349		19,425		48,014	488,004
17	22,799	3,715	26,514	169,634				25,643	221,793
18	364,041	39,147	403,188	348,268		296,927		8,653	1,057,036
19	7,575	525	8,100	154,020		2,123		16,494	180,737
20	1,431		1,431	1,592				6,018	9,041
<u>Total N.C.</u>	<u>741,248</u>	<u>105,322</u>	<u>846,570</u>	<u>1,195,949</u>		<u>333,098</u>	<u>27,400</u>	<u>145,052</u>	<u>2,488,569</u>
<u>Grand Total</u>	<u>1,132,493</u>	<u>221,897</u>	<u>1,354,390</u>	<u>1,705,664</u>		<u>368,825</u>	<u>71,700</u>	<u>326,903</u>	<u>3,827,682</u>

\*See Table on Waterfowl Location Description.

Table          Hunting Season Waterfowl Days Utilization of Back Bay, Va. and Currituck Sound, N.C. from November 21, 1959 to January 8, 1960.

Area No.*	Dabbling Duck/Days	Diving Duck/Days	Total Duck/Days	Canada Geese/Days	Brant/Days	Coot/Days	Snow Geese/Days	Swan/Days	Total Waterfowl/Days
1	4,529		4,529						4,529
2	4,547	80	4,627	1,960				969	7,556
3	3,098	417	3,535	111		60		425	4,111
4	268,316	53,958	322,274	421,259		17,543	39,600	247,587	1,048,263
5	216		216					2,400	5,091
6	16,204	255	16,459	26,829			1,750	17,325	62,363
7	44,847	1,137	45,984	23,219		8,985	863,200	39,041	985,429
8	1,678	84	1,762	3,850				600	6,212
<b>Total Va.</b>	343,435	55,931	399,366	484,703		26,588	904,550	308,347	2,123,554
9	23,477		23,477	15,324		1,067	24,000	12,436	76,304
10	43,584	299	43,883	17,061		5,060	33,500	11,850	111,354
11	37,842	571	38,413	840			303,675	224	343,152
12	12,626	13	12,639	2,730					15,369
13	13,225	63,625	75,850	118,922		1,105		73,223	270,100
14	2,515	262,369	264,884	357,583				115,817	738,284
15	3,506	1	3,507	30,621				37,781	71,909
16	44,817	9,678	54,495	72,909		24,488	38,850	70,637	261,379
17	6,044	6,769	12,813	167,201				47,971	227,985
18	407,084	219,600	626,684	181,378		783,764		53,351	1,645,177
19	8,075	23,230	31,305	198,354		26,955		9,034	265,648
20	643	1,392	2,035	6,499				19,728	28,262
<b>Total N.C.</b>	603,438	587,547	1,190,985	1,169,422		842,439	400,025	452,052	4,054,923
<b>Grand Total</b>	9116,873	643,478	1,590,351	1,654,025		869,027	1,304,575	760,399	6,178,477

\*See Table on Waterfowl Location Description.

Table       , Post-Hunting Season Waterfowl Days Utilization of Back Bay, Va. And Currituck Sound, N. C. from January 8, 1960 to April 8, 1960.

Area No.*	Dabbling Duck/Days	Diving Duck/Days	Total Duck/Days	Canada Geese/Days	Brant/Days	Coot/Days	Snow Geese/Days	Swan/Days	Total Waterfowl/Days
1	16,817	45	16,862					26	16,888
2	26,881		26,881					9,788	36,669
3	1,717	2,213	3,930	21,465		36		15,460	40,891
4	108,002	1,713	109,715	144,444			140,600	37,316	432,075
5	4,062		4,062	31,770				630	36,462
6	23,157	510	23,667	26,142			156,000	17,279	223,088
7	145,376	912	146,288	20,470			1,256,475	32,195	1,455,428
8	339		339						339
<u>Total Va.</u>	326,351	5,393	331,744	244,291		36	1,553,075	112,694	2,241,840
9	43,213	3,257	46,470	42,432			561,900	69,618	720,420
10	176,633	32,505	209,138	97,305		260		111,073	417,776
11	65,820	26,637	92,457	21,250			164,785	5,381	283,823
12	14,492	3,125	17,617	364					17,981
13	6,494	60,452	66,946	99,001			23,400	12,641	201,988
14	1,102	16,355	17,457	38,465				3,402	59,324
15	7,933	7,384	15,317	34,386				55,592	105,295
16	81,348	121,702	203,050	129,020		225	46,475	208,291	587,061
17	2,658	107,075	109,733	144,093			9,000	53,766	316,592
18	178,922	87,296	266,218	194,026		1,262,350		179,229	1,901,823
19	20,329	45,366	65,695	135,685		208,785		18,042	428,207
20	3,945	7,955	11,900	38,594				16,780	67,274
<u>Total N.C.</u>	602,889	519,109	1,121,998	974,621		1,471,620	805,510	733,815	5,107,564
<u>Grand Total</u>	929,240	524,502	1,453,742	1,218,912		1,471,656	2,358,585	846,509	7,349,404

\*See Table on Waterfowl Location Description.

Table \_\_\_\_\_ Waterfowl Days Utilization of Back Bay, Va. and Currituck Sound, N. C. Computed from Twenty Aerial Inventories from September 19, 1959 to April 8, 1960.

Area	Dabbling	Diving	Total	Canada		Snow		Total.	
No.*	Duck/Days	Duck/Days	Duck/Days	Geese/Days	Brant/Days	Coot/Days	Geese/Days	swim/Days	Waterfowl/Days
1	22,255	45	22,300	552				26	22,878
2	33,147	3,556	36,677	13,520				10,757	65,954
3	5,567	2,630	8,197	28,226		96		15,933	52,452
4	694,681	164,174	860,855	970,722		37,678	202,506	419,271	2,491,026
5	5,562		5,562	41,470				3,030	50,062
6	70,564	765	71,329	152,677		312	171,750	71,594	467,662
7	225,411	4,171	229,582	66,932		24,265	2,127,675	76,881	2,525,335
8	3,844	84	3,928	19,810				5,400	29,133
Total									
Va.	1,061,031	177,399	1,238,430	1,298,909		62,351	2,501,925	602,892	5,704,507
9	126,552	3,857	130,409	77,656		6,890	585,900	82,694	883,751
10	262,229	33,329	295,558	153,496		14,120	60,900	139,933	664,007
11	110,977	27,208	138,185	39,065			468,410	6,550	652,230
32	34,432	3,243	37,675	14,661					52,336
13	22,738	127,899	150,637	296,709		1,105	23,400	96,092	567,963
14	4,481	295,084	299,565	504,248				129,323	933,136
15	13,917	7,708	21,625	95,513				94,476	211,614
16	348,681	172,080	520,761	359,278		44,138	85,325	326,942	1,336,444
17	31,501	117,559	149,060	480,928			9,000	127,380	766,368
18	950,047	346,043	1,296,090	723,672		2,343,041		241,233	4,604,036
19	35,979	69,121	105,100	488,059		237,363		43,570	874,592
20	6,019	9,347	15,366	46,635				42,526	104,577
Total									
N.C.	7,573	1,212,478	3,160,051	3,279,992		2,647,157	1,232,935	1,330,919	11,651,054
Grand									
Total	3,008,604	1,389,877	4,398,481	4,578,901		2,709,508	3,734,860	1,933,811	17,355,561

\*See Table on Waterfowl Location Description.

Table. Pre-Hunting Season Waterfowl Days Utilization of Back Bay, Va. and Currituck Sound, N. C. from September 20, 1960 to November 17, 1960.

Area NO.	Dabbling Duck/Days	Diving Duck/Days	Total Duck/Days	Canada Geese/Days	Brant/Days	Coot/Days	Snow Geese/Days	Swan/Days	Total Waterfowl/Days
1	2,189	1,827	4,016			290			4,306
2	3,516		3,516	1,769					5,285
3	2,101		2,101	6,880		43			9,024
4	190,586	103,662	294,248	236,886		53,199		36,163	620,496
5	3,986		3,986	24,941		2,175		6,670	37,772
6	20,473		20,473	21,520					41,993
7	66,722	23,055	89,777	85,979		42,037		3,335	221,128
8	282		282						282
<b>Total Va.</b>	<b>289,855</b>	<b>128,544</b>	<b>418,399</b>	<b>377,975</b>		<b>97,744</b>		<b>46,168</b>	<b>940,286</b>
9	53,303	1,610	54,913	71,009		90,015		290	216,227
10	138,826	8,745	147,571	138,520		17,766	55,100	13,340	372,297
11	8,697		8,697	18,545					27,242
12	1,186		1,186	3,480					4,666
13	682		682	58,165					58,847
14	4,292	193,081	197,373	32,559		1,160		6,322	237,414
15	3,735		3,735	49,084		1,015		2,175	56,009
16	98,290	957	99,247	202,816		137,585		59,827	499,475
17	5,510	3,770	9,280	13,920				31,900	55,100
18	200,473	44,254	244,727	546,120		279,585		27,811	1,098,243
19	10,529	1,885	12,414	29,960				87,000	129,374
20	305		305	47,605		7,975		2,175	58,060
<b>Total N.C.</b>	<b>525,828</b>	<b>254,302</b>	<b>780,130</b>	<b>1,211,783</b>		<b>535,101</b>	<b>55,100</b>	<b>230,840</b>	<b>2,812,954</b>
<b>Grand Total</b>	<b>815,683</b>	<b>382,846</b>	<b>1,198,529</b>	<b>1,589,758</b>		<b>632,845</b>	<b>55,100</b>	<b>277,008</b>	<b>3,753,240</b>

\*See Table on Waterfowl Location Description.

Table. Hunting season Waterfowl Days Utilization of Back Bay, Va., and Currituck Sound, N. C. from November 17, 1960 to January 7, 1961.

Area No.	Dabbling Duck/Days	Diving Duck/Days	Total Duck/Days	Canada Goose/Days	Brant/Days	Coot/Days	Snow Goose/Days	Swan/Days	Total Waterfowl/Days
1	18,905	567	19,472			251			13,723
2	3,642		3,642	3,699				700	8,041
3	443	2,184	2,627	8,400				42	11,069
4	245,844	106,606	352,450	888,410		92,134	182,670	294,237	1,809,901
5	2,263	5,410	7,673	15,476		657		10,096	34,102
6	6,237	59,310	65,547	42,088		10,560		19,397	137,642
7	70,371	13,122	83,493	41,825		196,242	354,900	17,317	695,777
8	5,023	63	5,091						5,091
Total Va.	352,733	187,262	540,045	999,898		302,044	537,570	341,789	2,721,346
9	99,922	950	100,872	810		103,590	49,140	1,140	255,552
10	112,779	4,415	117,194	148,775		186,380	321,100	22,452	795,901
11	18,998	525	19,523				23,100	182	42,805
12	5,542		5,542	1,080					6,622
13	15,432	44,765	60,197	234,040			91,000	1,400	386,637
14	21,754	262,610	284,364	583,102		2,560		136,710	1,006,736
15	2,226	21,644	23,870	66,535		4,635		29,963	125,003
16	184,326	32,623	216,949	158,323		345,440	51,626	93,913	866,251
17	154,962	505,298	660,260	621,440				184,385	1,466,085
18	533,579	433,374	976,953	249,512		1,231,230		78,495	2,536,190
19	51,332	38,226	89,558	536,975		400,035		2,910	1,029,478
20	573	394	967	102,735				54,280	157,962
Total N.C.	1,206,425	1,349,824	2,556,249	2,703,327	0	2,273,870		535,966	8,675,242
Grand	1,537,086	1,539,088	3,096,294	3,703,225	0	2,575,914	1,073,536	947,619	11,396,588

\*See Table on Waterfowl Location Description,

**Table . . . Post-Hunting Season Waterfowl Days Utilization of Back Bay, Va. and Currituck Sound, N. C. from January 7, 1961 to April 9, 1961.**

Area No.*	Dabbling Duck/Days	Diving Duck/Days	Total Duck/Dam	Canada Geese/Days	Brant/Days	Coot/Days	snow Geese/Days	Swan/Days	Total Waterfowl/Days
1	9,812	6,620	16,432			792			17,224
2	8,539	2,775	11,314	86,275		1,050		8,044	108,683
3	6,033	39,002	45,035	15,409		17,250		3,615	81,309
4	229,977	40,788	270,765	368,797		72,716	230,635	143,089	1,086,002
5	3,800		3,800	381,650		27,525	56,950	70,375	540,300
6	35,690	4,500	40,190	60,552			170,050	47,124	317,916
7	74,929	4,790	79,719	9,370		104,865	654,710	22,243	870,907
8	15,551		15,551	18,625			9,450		43,626
<b>Total Va.</b>	<b>384,331</b>	<b>98,475</b>	<b>482,806</b>	<b>942,678</b>		<b>224,198</b>	<b>1,121,795</b>	<b>294,490</b>	<b>3,065,967</b>
9	35,389	600	35,963	25,735		22,005	361,635	36,685	482,049
10	173,661	182,850	356,511	164,510		165,345	245,249	88,171	1,019,786
11	47,376		47,376	3,000		1,933	394,200	5,009	451,518
12	1,608		1,608	6,200					9,808
13	26,074	410	26,484	148,610			27,500	4,595	207,189
14	10,839		10,839	274,867		8,400		61,449	355,555
15	22,644	19,950	42,594	36,825		10,910		18,145	108,474
16	112,500	83,253	195,753	99,335		36,110	769,100	149,835	1,250,133
17	17,135	151,010	168,145	136,805		49,400		37,793	442,143
18	146,742	250,439	397,101	154,949		856,450	9,600	131,206	1,549,386
19	9,656	136,238	145,894	216,650		348,990		2,390	715,924
20	1,808	9,505	11,313	126,650		LG. 570		13,954	300,489
<b>Total N.C.</b>	<b>605,432</b>	<b>834,255</b>	<b>1,439,687</b>	<b>1,448,136</b>		<b>1,648,113</b>	<b>1,807,284</b>	<b>549,234</b>	<b>6,892,454</b>
<b>Grand Total</b>	<b>989,763</b>	<b>932,730</b>	<b>1,922,493</b>	<b>2,390,814</b>		<b>1,872,311</b>	<b>2,929,079</b>	<b>843,724</b>	<b>9,958,421</b>

\*See Table on Waterfowl Location Description.

Table. Waterfowl Days -utilization of Back Bay, Va. and Currituck Sound, N.C. Computed from Fifteen Aerial Inventories from September 20, 1960 to April 19, 1963.

Area No.	Dabbling Duck/Days	Diving Duck/Days	Total Duck/Days	Canada Geese/Days	Brant/Days	Coot/Days	Snow Geese/Days	Swan/Days	Total Waterfowl/Days
1	30,906	9,014	39,920			1,333			41,253
2	15,697	2,775	18,472	93,743		1,050		3,774	122,009
3	8,577	41,186	49,763	30,689		17,293		3,657	101,402
4	666,407	251,056	917,546	1,494,093		218,049	413,305	473,489	3,516,399
5	10,049	5,410	15,459	422,067		30,557	56,950	87,141	603,174
6	62,450	63,810	126,260	124,160		10,560	170,050	66,521	497,551
7	212,022	40,967	252,939	137,174		345,144	1,009,610	42,895	1,787,812
3	<u>20,861</u>	<u>63</u>	<u>20,924</u>	<u>16,625</u>			<u>9,450</u>		<u>48,999</u>
Total Va.	1,026,969	414,281	1,441,250	2,320,551		623,986	1,659,365	682,447	6,727,599
9	188,614	3,160	191,774	97,554		215,610	410,775	38,115	953,828
10	425,266	196,010	621,276	451,305		369,491	621,449	123,963	2,187,984
11	75,071	525	75,596	21,545		1,933	417,300	5,191	521,565
12	8,336		8,336	12,760					21,096
13	42,188	45,175	87,363	440,815			118,500	5,995	652,673
14	36,835	455,691	492,576	890,528		12,120		204,481	1,599,705
15	28,605	41,594	70,199	152,444		16,560		50,233	289,436
16	395,116	116,833	511,949	460,474		519,135	820,726	303,575	2,615,859
17	177,677	660,078	837,685	822,165		49,400		254,078	1,963,328
18	885,794	733,067	1,618,861	950,581		2,367,265	9,600	237,512	5,183,819
19	71,517	176,349	247,366	785,585		749,025		92,300	1,874,776
20	<u>2,696</u>	<u>9,899</u>	<u>12,585</u>	<u>276,990</u>		<u>156,545</u>		<u>70.4</u>	<u>516,531</u>
Total N.C.	2,337,685	2,438,381	4,776,066	5,363,246		4,457,084	2,398,350	1,385,904	18,380,650
Grand Total	3,364,654	2,852,662	6,217,316	7,683,797		5,081,070	4,057,715	2,068,351	25,108,249

\*See Table on Waterfowl Location Description.

Table . Waterfowl Days Utilization of Back Bay, Virginia, and Currituck Sound, North Carolina, Computed from Eight Aerial Inventories from September 23, 1961 to April 6, 1962.

Area No.*	Dabbling Duck/Days	Diving Duck/Days	Total Duck/Days	Canada Geese/Days	Coot/Days	snow Geese/Days	Swan/Days	Total Waterfowl/Days
1	3,934	43	<b>3,977</b>	4,030	500	0	398	8,905
2	24,899	203,714	228,613	8,496	450	0	3,643	241,202
3	2,256	12,656	14,912	18,870	0	0	4,723	38,505
4	782,379	521,381	<b>1,303,760</b>	<b>1,246,668</b>	39,040	139,810	371,247	<b>3,100,525</b>
5	14,376	17,292	<b>31,668</b>	137,120	37,690	447,200	4 4	653,722
6	75,048	230,866	305,914	326,706	0	0	182,891	815,511
7	323,912	29,567	353,478	63,415	111,708	<b>1,828,750</b>	118,919	<b>2,476,271</b>
8	7,670	0	<b>7,670</b>	22,190	0	0	443	30,303
Tot-al								
Virginia	<b>1,234,474</b>	<b>1,015,519</b>	<b>2,249,993</b>	<b>1,827,495</b>	189,388	<b>2,415,760</b>	682,308	<b>7,364,944</b>
9	231,013	5,416	<b>236,429</b>	196,061	147,045	692,800	48,875	<b>1,321,210</b>
10	398,559	285,260	<b>683,819</b>	99,986	295,340	526,550	54,063	<b>1,659,758</b>
11	85,031	54,855	<b>139,886</b>	45,278	4,040	81,150	32,196	-3021550
12	8,184	0	8,184	0	0	0	0	8,184
13	8,964	102,179	111,143	305,400	86	182,380	42,491	641,500
14	95,070	<b>1,292,895</b>	<b>1,387,965</b>	865,025	1,200	30,000	58,751	<b>2,342,941</b>
15	21,697	107,295	<b>128,992</b>	35,923	2,253	0	62,333	229,501
16	423,087	202,374	<b>625,461</b>	880,205	91,166	172,850	208,941	<b>1,978,623</b>
17	88,396	212,700	<b>301,096</b>	767,193	0	0	250,546	<b>1,318,835</b>
18	<b>1,326,899</b>	562,357	<b>1,899,256</b>	831,861	<b>2,607,735</b>	0	154,578	<b>5,483,430</b>
19	165,508	265,326	430,834	654,675	464,803	0	19,563	<b>1,569,875</b>
20	6,021	4,193	10,214	143,330	47,115	0	45,316	245,975
Total								
North Carolina	<b>2,858,429</b>	<b>3,094,850</b>	<b>5,953,279</b>	<b>4,824,937</b>	<b>3,660,783</b>	<b>1,685,730</b>	977,653	<b>17,102,382</b>
Grand Total	<b>4,092,903</b>	<b>4,110,369</b>	<b>8,203,272</b>	<b>6,652,432</b>	<b>3,850,171</b>	<b>4,101,490</b>	<b>1,659,961</b>	<b>24,467,326</b>

\* See Table on Waterfowl Location Description.

Table . . . Waterfowl Days Utilization of Back Bay, Virginia, and Currituck Sound, North Carolina,  
 Computed from Eight Aerial Inventories from September 19, 1962, to April 9, 1963.

Area No. *	Dabbling		Diving		Total**		Canada		Snow		Total Water- fowl Days***			
	Duck	Days	Duck	Days	Duck	Days	Geese	Days	Coot	Days		Geese	Days	Swan
1		2,596				2,731							427	3,158
2		40,537				40,537		5,995					57,950	104,482
3		50,825		10,224		63,179		108,586					46,798	218,563
4		<b>1,232,846</b>		469,097		<b>1,702,513</b>		<b>2,108,722</b>		46,585	166,850		381,690	<b>4,406,360</b>
5		22,537		705		23,527		226,942		3,750	<b>1,580,338</b>		20,520	<b>1,855,239</b>
6		759,893		147,236		907,129		372,570		3,602	72,918		359,780	<b>1,715,999</b>
7		363,699		77,465		441,164		194,207		39,430	418,250		168,887	<b>1,261,938</b>
8		11,233				11,233		24,500		915	7,000		1,425	45,073
Total Virginia		<b>2,484,166</b>		704,727		<b>3,192,013</b>		<b>3,041,522</b>		94,282	<b>2,245,356</b>		<b>1,037,477</b>	<b>9,610,812</b>
9		107,809		4,334		113,568		120,390		18,998			21,280	274,236
10		851,060		213,732		<b>1,064,792</b>		275,735		116,276	<b>1,099,500</b>		220,092	<b>2,776,395</b>
11		331,529		10,935		342,606		67,467		7,725	976,200		51,180	<b>1,445,178</b>
12		55,383		58,995		114,378		11,400		325			15,390	141,493
13		28,768		9,250		38,018		<b>310,490</b>			54,000		151,510	554,018
14		57,119		<b>1,305,083</b>		<b>1,362,202</b>		<b>1,606,695</b>		140	122,000		218,205	<b>3,309,242</b>
15		29,245		359,036		388,281		61,425		6,134			103,527	559,367
16		492,909		16,510		509,718		290,930		5,668	242,485		308,257	<b>1,357,058</b>
17		47,941		159,155		207,666		707,135		560			237,110	<b>1,152,471</b>
18		<b>1,420,596</b>		89,463		<b>1,517,326</b>		991,929		514,713	199,320		292,567	<b>3,515,855</b>
19		91,940		368,402		460,343		861,920		146,200			11,092	<b>1,479,555</b>
20		64,648		1,670		66,603		219,655		109,167			92,380	487,805
Total North Carolina		<b>3,578,947</b>		<b>2,596,565</b>		<b>6,185,501</b>		<b>5,525,171</b>		925,906	<b>2,693,505</b>		<b>1,722,590</b>	<b>17,052,673</b>
Grand Total		<b>6,063,113</b>		<b>3,301,292</b>		<b>9,377,514</b>		<b>8,566,693</b>		<b>1,020,188</b>	<b>4,938,861</b>		<b>2,760,067</b>	<b>26,663,485</b>

\* See table on waterfowl location description.

\*\* Includes 12,825 Red-breasted Merganser days and 284 Hooded Merganser days.

\*\*\* Includes 162 Blue Geese days.

Table , Pre-Hunting Season Waterfowl Days Utilization of Back Bay, Virginia, and Currituck Sound, North Carolina, from September 19, 1962, to November 14, 1962.

Area No.*	Dabbling Duck		Diving Duck		Total Duck		Canada Geese		Coot Days	Snow Geese		Swan Days	Total Waterfowl Days
	Duck Days	Days	Duck Days	Days	Duck Days	Days	Geese Days	Days		Geese Days	Days		
1		330				330							330
2		56				56	5,320						5,376
3		170		334		504		336					840
4	639,999		247,194		887,193		744,840		27,760	15,400		31,900	1,707,093
5		932				932	8,510		220				9,662
6	24,343		1,036		25,379		57,900		942	28		1,818	86,067
7	88,374		58,800		147,174		75,565		10,600			275	233,614
8.		498				498							498
Total Virginia	754,702		307,364		1,062,066		892,471		39,522	15,428		33,993	2,043,480
9	11,239		119		11,358		20,160		4,788				36,306
10	154,249		662		154,911		6,740		81,101	126,500		2,475	371,727
11	27,682		715		28,397		16,420		2,750			4,180	51,747
12	6,528				6,528				168				6,696
13	3,210		700		3,910		29,590					4,620	38,120
14	4,794		165		4,959		89,100		140			1,210	95,409
15	2,865		616		3,481		4,180		34			495	8,190
16	131,631				131,631		99,070		5,668			18,700	255,069
17	8,360		54,900		63,260		86,910		560			2,200	152,930
18	380,431		23,677		404,108		261,554		113,288			15,950	794,900
19	2,090				2,090		34,100		8,800				44,990
20	2,868		165		3,033		9,820		17			7,150	20,920
Total N. C.	735,947		81,719		817,666		657,644		217,314	126,500		56,980	1,876,104
Grand Total	1,490,649		389,083		1,879,732		1,550,115		256,836	141,928		90,973	3,919,584

\* See table on waterfowl location description.

Table . Hunting Season Waterfowl Days Utilization of Back Bay, Virginia, and Currituck Sound, North Carolina, from November 14, 1962, to January 10, 1963.

Area No.*	Dabbling		Diving		Total**		Canada		Snow			Total Water- fowl Days		
	Duck	Days	Duck	Days	Duck	Days	Geese	Days	Coot	Days	Geese		Days	Swan
1		1,208				1,208							427	1,635
2		210				210								210
3		35,167		4,550		41,712		71,310					43,270	156,292
4		<b>423,900</b>		217,170		641,640		812,970		18,825		20,300	187,662	<b>1,681,397</b>
5		8,115		285		8,685		<b>135,233</b>		290			20,520	164,728
6		251,005		18,400		269,405		117,350					154,795	541,550
7		139,409		18,525		157,934		110,407		28,550,		342,000	167,087	805,978
8		<u>3,750</u>				<u>3,750</u>		<u>1,400</u>					<u>1,425</u>	<u>6,575</u>
Total Virginia		<u>862,764</u>		<u>258,930</u>		<u>1,124,544</u>		<u>1,248,670</u>		<u>47,665</u>		<u>362,300</u>	<u>575,186</u>	<u>3,358,365</u>
9		75,197		2,420		79,042		98,610		2,900			20,730	201,282
10		212,262		420		212,682		160,395		10,875		850,500	69,542	<b>1,303,994</b>
11		179,473		10,132		189,747		32,060		4,045		<b>355,700</b>	33,045	614,597
12		45,910		58,995		104,905		11,400		70			15,390	131,765
13		19,208		8,550		27,758		207,275					34,845	269,878
14		12,940		227,018		239,958		684,275					124,245	<b>1,048,478</b>
15		11,530		130,095		<b>141,625</b>		33,530					53,498	228,653
16		309,498		560		310,343		74,435				204,700	124,735	714,213
17		20,605		99,980		121,155		387,705					87,995	596,855
18		900,605		51,090		958,962		667,555		231,890			115,975	<b>1,974,382</b>
19		57,827		18,027		75,855		399,500		62,100			6,942	544,397
20		<u>58,612</u>		<u>930</u>		<u>59,827</u>		<u>168,335</u>		<u>15,400</u>			<u>67,935</u>	<u>311,497</u>
Total N. C.		<u>1,903,667</u>		<u>608,217</u>		<u>2,521,858</u>		<u>2,925,075</u>		<u>327,280</u>		<u>1,410,900</u>	<u>754,878</u>	<u>7,939,991</u>
Grand Total		<b>2,766,431</b>		867,147		<b>3,646,402</b>		<b>4,173,745</b>		374,945		<b>1,773,200</b>	<b>1,330,064</b>	<b>11,298,356</b>

\* See table on waterfowl location description.

\*\* Includes Mergansers in following areas: (3) 1,995; (4) 570; (5) 285; (9) 1,425; (11) 142; (16) 285; (17) 570; (18) 7,267; (20) 285.

Table . **Post-Hunting** Season Waterfowl Days Utilization of Back Bay, Virginia, and Currituck Sound, North Carolina, from January 10, 1963 to April 9, 1963.

Area No.*	Dabbling		Diving		Total**		Canada		Snow		Total Water- fowl Days			
	Duck	Days	Duck	Days	Duck	Days	Geese	Days	Coot	Days		Geese	Days	Swan
1		<b>1,058</b>				1,193								1,193
2		40,271				40,271		675					57,950	98,896
3		15,488		5,340		20,963		36,940					3,528	61,431
4		168,947		4,733		173,680		550,912				131,150	162,128	<b>1,017,870</b>
5		13,490		420		13,910		83,200		3,240		<b>1,580,338</b>		<b>1,680,850***</b>
6		484,545		127,800		612,345		197,320		2,660		72,890	203,167	<b>1,088,382</b>
7		135,916		140		136,056		8,235		280		76,250	1,525	222,346
8		<u>6,985</u>				<u>6,985</u>		<u>23,100</u>		<u>915</u>		<u>7,000</u>		<u>38,000</u>
Total Virginia		866,700		138,433		<b>1,005,403</b>		900,382		7,095		<b>1,867,628</b>	428,298	<b>4,208,968</b>
9		21,373		1,795		23,168		1,629		11,310			550	36,648
10		484,549		212,650		697,199		108,600		24,300		122,500	148,075	<b>1,100,674</b>
11		124,374		88		124,462		18,987		930		620,500	13,955	778,834
12		2,945				2,945				87				3,032
13		6,350				6,350		73,625				54,000	112,045	246,020
14		39,385		<b>1,077,900</b>		<b>1,117,285</b>		833,320				122,000	<b>92,750</b>	<b>2,165,355</b>
15		14,850		228,325		243,175		23,715		6,100			49,535	322,525
16		51,780		15,950		67,744		117,425				37,785	164,823	387,777
17		18,976		4,275		23,251		232,520					146,915	402,686
18		139,560		14,696		154,256		62,820		169,535		199,320	160,642	746,573
19		32,023		350,375		382,398		428,320		75,300			4,150	890,168
20		<u>3,168</u>		<u>575</u>		<u>3,743</u>		<u>41,500</u>		<u>93,750</u>			<u>17,295</u>	<u>156,288</u>
Total N. Carolina		939,333		<b>1,906,629</b>		<b>2,845,976</b>		<b>1,942,452</b>		381,312		<b>1,156,105</b>	910,735	<b>7,236,580</b>
Grand Total		<b>1,806,033</b>		<b>2,045,062</b>		<b>3,851,379</b>		<b>2,842,834</b>		388,407		<b>3,023,733</b>	<b>1,339,033</b>	<b>11,445,548</b>

\* See table on waterfowl location description.

\*\* Includes 284 Red-breasted Merganser days.

\*\*\* Includes 162 Blue Geese days.

Table . Waterfowl Days Utilization of Back Bay, Virginia, and Currituck Sound, North Carolina, from Seven\* Aerial Inventories from September 17, 1963, to April 5, 1964.

Area No.	Dabbling Duck Days	Diving Duck Days	Total Duck Days	Canada Geese Days	Coot Days	Snow Geese Days	Swan Days	Total Waterfowl Days
1	7,840	0	7,840	200	0	0	0	8,040
2	3,850	52,000	55,850	0	0	0	1,675	57,525
3	8,192	0	8,192	18,598	0	241	0	27,031
4	397,796	2,600	400,396	702,051	0	569,250	26,204	1,697,901
5	28,475	0	28,475	219,935	0	3,022,515	0	3,170,925
6	8,424	0	8,424	148,335	0	450	675	157,884
7	278,837	954	279,791	73,735	800	492,000	6,696	853,022
8	15,098	0	15,098	42,465	0	32,200	0	89,763
Total								
Va.	748,512	55,554	804,066	1,305,319	800	4,116,656	35,250	6,262,091
9	70,287	3,000	73,287	160,792	1,496	46	26,578	262,199
10	129,364	6,300	135,664	853,495	80	522,160	126,922	1,638,321
11	237,068	200	237,268	5,790	0	34,000	239	277,297
12	4,526	0	4,526	0	0	0	0	4,526
13	30,688	19,500	50,188	357,880	0	12,000	64,990	485,058
14	32,715	1,729,385	1,762,100	683,963	0	20,000	870,787	3,336,850
15	34,520	179,290	213,810	177,336	4,590	0	171,555	567,291
16	248,649	299,541	548,190	168,885	24,000	108,900	25,385	875,360
17	319,289	2,017,000	2,336,289	636,805	160,000	0	356,050	3,489,144
18	1,405,251	1,068,458	2,473,709	482,685	1,091,015	28,575	131,065	4,207,049
19	43,055	261,000	304,055	837,126	1,134,612	0	14,511	2,290,304
20	2,575	159,600	162,175	193,698	47,850	0	79,025	482,748
Total								
N.C.	2,557,987	5,743,274	8,301,261	4,558,455	2,463,643	725,681	1,867,106	17,916,146
Grand								
Total	3,306,499	5,798,828	9,105,327	5,863,774	2,464,443	4,842,337	1,902,356	24,178,237

\* Data based on seven inventories of Back Bay and six of Currituck Sound.

Table. Waterfowl Days Utilization Per Acre of Back Bay, Va. and Currituck Sound, N. C. Computed from  
Thirteen Aerial Inventories from September 24, 1958 to March 26, 1959.

Area No. #	DAYS PER ACRE:								
	Dabbling Duck/Days	Diving Duck/Days	Total Duck/Days	Canada Geese/Days	Brant/Days	Coot/Days	Snow Geese/Days	Swan/Days	Total. Waterfowl/bays
3	1.6	2.2	3.8						3.8
4	4.2		4.2	15.3				2.7	22.2
5	7.4	8.1	15.5	60.9		2.2		6.5	85.1
	28.5	5.6	34.1	85.4		7.0	40.2	7.0	173.7
	1.2	0.1	1.3	5.5		0.2			7.0
6	9.5	1.5	11.0	23.2	0.2	2.0	69.4	7.0	112.8
7	28.8	3.8	32.6	14.4	1.3	7.7	103.1	11.3	170.4
8	0.2	0.1	0.3	0.5	0.1				0.9
Average <u>12. Va.</u>		2.4	14.6	29.0	0.2	29.0	32.8	4.4	63.9
9	40.1	3.9	44.0	45.3	2.6	16.8	74.5	6.5	169.7
10	76.0	5.4	81.4	31.9	3.3	19.4	2c.2	11.7	175.9
12	18.7	0.1	18.8	0.1			27.9	0.3	47.1
13	3.3		3 "						3.8
14	2.0	8.5	10.5	7.2	0.5		36.1	2.4	106.7
15	21.4	10.0	31.4	30.0				12.3	73.7
	1.0	1.2	2.2	8.2				7.3	17.7
16	36.7	10.3	47.0	40.9	1.4	26.1		26.6	1e.0
17	0.5	1.1	1.6	11.7				6.0	19.3
18	29.2	23.0	52.2	32.8	1.3	79.4		9.9	175.6
19	12.3	11.6	23.9	32.3		68.0		0.4	124.6
20	0.2	0.5	0.7	0.1				0.2	1.0
Average <u>in N.C.</u>	16.6	8.0	24.6	19.5	0.6	22.1	13.2	7.3	37.5
Average <u>Entire Area</u>	15.5	6.6	22.1	21.9	0.5	17.3	18.1	6.6	66.5

\*See Table on Waterfowl Location Description.

Table. Waterfowl Days Utilization Per Acre of Rack Bay, Va. and Currituck Sound, N. C. Computed from Twenty Aerial Inventories from September 19, 1959 to April 8, 1960.

Area No. *	DAYS PER ACRE:								Total Waterfowl/Days
	Dabbling Duck/Days	Diving Duck/Days	Total Duck/Days	Canada Geese/Days	Brant/Days	Coot/Days	snow Geese/Days	Swan/Days	
1	19.9		19.9	0.5					20.4
2	24.0	2.6	26.6	13.4				7.8	47.8
3	3.4	1.6	5.0	17.4		0.1		9.8	32.4
4	86.8	20.8	107.6	121.3		4.7	25.3	52.4	311.4
5	0.7		0.7	4.9				0.4	5.9
6	11.7	0.1	11.8	25.3		0.1	28.4	11.9	77.4
7	51.3	1.0	52.3	15.2		5.5	484.7	17.5	575.2
8	0.7		0.7	3.7				1.0	5.1
Average in Va.	29.1	4.9	34.0	35.7		1.7	68.7	16.5	156.6
9	41.4	1.3	42.7	25.4		2.3	191.5	27.1	288.8
10	60.3	7.7	68.0	35.3		3.2	14.0	32.2	152.6
11	23.1	5.7	23.8	8.1			97.6	1.4	135.9
12	10.9	1.0	11.9	4.7					16.6
13	2.0	11.5	13.5	26.6		0.1	2.1	3.6	50.9
14	0.5	29.7	30.2	50.7				13.0	93.8
15		1.3	3.6	15.7				15.6	34.9
16	3 %	16.4	49.6	34.2		4.2	8.1	31.2	127.4
17	2.7	10.0	12.7	41.0			0.8	10.9	65.3
18	52.9	19.3	72.2	40.3		130.5		13.4	256.5
19	4.2	8.1	12.3	57.3		27.9		5.1	102.7
20	0.3	0.5	0.3	2.6				2.4	5.8
Average in N.C.	17.8	11.1	28.9	30.0		24.2	11.3	12.2	106.6
Average Entire Area	20.6	9.5	30.1	31.4		18.6	25.6	13.3	119.1

\*See Table on Waterfowl Location Description.

Table . Waterfowl Days Utilization Per Acre of Back Bay, Va. and Currituck Sound, N. C. Computed from Thirteen Aerial Inventories from September 20, 1960 to April 9, 1961.

Area No. *	DAYS PER ACRE:								
	Dabbling Duck/Days	Diving Duck/Days	Total Duck/Days	Canada Geese/Days	Brant/Days	Coot/Days	Snow Geese/Days	Swan/bays	Total Waterfowl/Days
1	27.7	8.0	35.7			1.2			36.9
2	11.4	2.0	13.4	68.0		0.8		6.3	88.5
3	5.3	25.4	30.7	18.9		10.6		2.2	62.4
4	83.2	31.4	114.6	186.8		27.2	51.6	59.2	439.4
5	1.2	0.6	1.8	49.6		3.6	6.7	10.3	72.0
6	10.3	10.5	20.8	20.6		1.7	28.2	11.0	82.3
7	48.3	9.4	57.7	38.2		78.6	229.9	9.8	407.2
8	3.9		3.9	3.5			1.8		9.2
<u>Average in Va.</u>	28.2	11.3	39.5	63.7		17.1	45.6	18.7	184.6
9	61.7	1.0	-62.7	31.9		70.5	134.3	12.5	311.9
10	97.7	45.1	142.8	103.8		84.9	142.9	28.6	503.0
11	15.7	0.1	15.8	4.5		0.4	86.9	1.0	108.6
12	2.7		2.7	3.9					6.6
13	3.8	4.0	7.8	39.5			10.7	0.5	58.5
14	3.7	45.8	49.5	89.5		1.2		20.5	160.7
15	4.7	6.9	11.6	25.2		2.8		8.3	47.9
16	37.7	11.1	48.8	43.9		49.4	78.2	29.0	249.3
17	15.2	56.3	71.5	70.1		4.2		21.6	167.4
18	49.4	40.9	90.3	52.9		131.9	0.5	13.2	288.8
19	8.3	20.7	29.0	92.2		38.0		10.7	219.9
20	0.1	0.5	0.6	15.3		8.6		3.9	28.4
<u>Average in N.C.</u>	21.4	22.3	43.7	49.1		40.8	21.9	12.7	168.2
<u>Average Entire Area</u>	23.1	19.6	42.7	52.7		34.8	27.8	14.2	172.2

\*See Table on Waterfowl Location Description.

Table . Waterfowl Days Utilization Per Acre of Back Bay, Virginia, and Currituck Sound, North Carolina, Computed from Eight Aerial Inventories from September 23, 1961, to April 6, 1962.

Area No. *	Days Per Acre										Total Waterfowl/Days
	Dabbling Duck/Days	Diving Duck/Days	Total Duck/Days	Canada Geese/Days	Coot/Days	Geese/Days	Snow Geese/Days	Swan/Days	Total		
1	3.5	0.1	3.6	3.6	0.5			0.4	8.1		
2	18.0	147.6	165.6	6.2	0.3			2.6	174.7		
3	1.4	7.8	9.2	11.7				2.9	23.8		
4	97.8	65.2	163.0	155.8	4.9	17.5		46.4	387.6		
5	1.7	2.0	3.7	16.1	4.4	52.6			76.8		
6	12.4	38.2	50.6	54.1				30.3	135.0		
7	73.8	6.7	80.5	14.5	25.5	416.6		27.1	564.2		
8	1.4		1.4	4.1				0.1	5.6		
Total											
Virginia	33.9	27.9	61.8	50.2	5.2	66.3		18.7	202.2		
9	75.5	1.8	77.3	64.1	48.1	226.4		16.0	431.9		
10	91.6	65.6	157.2	23.0	67.9	121.1		12.4	381.6		
11	17.7	11.4	29.1	9.4	0.8	16.9		6.7	62.9		
12	2.6		2.6						2.6		
13	0.8	9.2	10.0	27.4		16.4		3.8	57.6		
14	9.6	129.9	139.5	86.9	0.1	3.0		5.9	235.4		
15	3.6	17.7	21.3	5.9	0.4			10.3	37.9		
16	40.3	19.3	59.6	83.9	8.7	16.5		19.9	188.6		
17	7.5	18.1	25.6	65.4				21.4	112.4		
18	73.9	31.3	105.2	46.3	145.3			8.6	305.4		
19	19.4	31.2	50.6	76.8	54.6			2.3	184.3		
20	0.3	0.2	0.5	7.9	2.6			2.5	13.5		
Total											
N.Carolina	26.2	28.3	54.5	44.2	33.5	15.4		8.9	156.5		
Grand Total	28.1	28.2	56.3	45.7	26.4	28.1		11.4	167.9		

\* See Table on Waterfowl Location Description.

Table . Waterfowl Days Utilization per Acre of Back Bay, Virginia, and Currituck Sound, North Carolina, Computed from Eight Aerial Inventories from September 19, 1962, through April 9, 1963.

Area No.	Days Per Acre												Total Waterfowl Days	
	Dabbling Duck Days		Diving Duck Days		Total** Duck Days		Canada Geese Days		Coot Days		Snow Geese Days			Swan Days
1	2.3				2.4								0.4	2.8
2	29.4				29.4		4.3						42.0	75.7
3	31.4		6.3		39.0		67.0						28.9	134.9
4	154.1		58.6		212.8		263.6		5.8		20.9		47.7	550.8
5	2.7		0.1		2.9		26.7		0.4		185.9		2.4	218.3
6	125.8		24.4		150.2		61.7		0.6		12.1		59.6	284.2
7	82.8		17.6		100.4		44.2		9.0		95.3		38.5	287.4
<b>8</b>	<u>2.1</u>		<u>    </u>		<u>2.1</u>		<u>4.6</u>		<u>0.2</u>		<u>1.3</u>		<u>0.3</u>	<u>8.5</u>
Average in Virginia	68.2		19.3		87.6		83.5		2.6		61.6		28.5	263.8
9	35.2		1.4		37.1		39.3		6.2		0.0		7.0	89.6
10	195.6		49.1		244.7		63.4		26.7		252.8		50.6	638.2
11	69.1		2.3		71.4		14.1		1.6		203.4		10.7	301.2
12	17.6		18.7		36.3		3.6		0.1				4.9	44.9
13	2.6		0.8		3.4		27.8				4.8		13.6	49.6
14	5.7		131.2		136.9		161.5		Tr.		12.3		21.9	332.6
15	4.8		59.1		63.9		10.1		1.0				17.1	92.1
16	47.0		1.6		48.6		27.7		0.5		23.1		29.4	129.3
17	4.1		13.6		17.7		60.3		Tr.				20.2	98.2
18	79.1		5.0		84.5		55.3		28.7		11.1		16.3	195.9
19	10.8		43.2		54.0		101.2		17.2				1.3	173.7
20	<u>3.6</u>		<u>0.1</u>		<u>3.7</u>		<u>12.2</u>		<u>6.0</u>		<u>    </u>		<u>5.1</u>	<u>27.0</u>
Average in North Carolina	32.8		23.8		56.7		50.6		8.5		24.6		15.8	156.2
Average Entire Area	41.6		22.7		64.4		58.8		7.0		33.9		18.9	183.0

\*\* Includes Red-breasted Merganser, Hooded Merganser.  
Tr. =< 0.05 day/acre.

**Table** . Waterfowl Days Utilization Per Acre of Back Bay, Virginia, and Currituck Sound, North Carolina, Computed from Seven\*\* Aerial Inventories from September 17, 1963, to April 5, 1964.

Area No.*	Days Per Acre:							
	Dabbling Duck Days	Diving Duck Days	Total Duck Days	Canada Geese Days	Coot Days	Snow Geese Days	Swan Days	Total Waterfowl Days
1	7.0		7.0	0.2	0.0		0.0	7.2
2	2.8	37.7	40.5		0.0		1.2	41.7
3	5.1		5.1	11.5	0.0	0.1		16.7
4	49.7	0.3	50.0	87.8	0.0	71.2	3.3	212.3
5	3.4		3.4	25.9	0.0	355.6		384.9
6	1.4		1.4	24.6	0.0	0.1	0.1	26.2
7	63.5	0.2	63.7	16.8	0.2	112.1	1.5	194.3
8	2.8		2.8	7.9	0.0	6.0		16.7
Average								
in Va.	20.5	1.5	22.0	35.8	0.0	113.0	1.0	171.8
9	23.0	1.0	24.0	52.5	0.5	0.0	8.7	85.7
10	29.7	1.4	31.1	196.2	0.0	120.0	29.1	376.4
11	49.4	0.0	49.4	1.2		7.1	0.0	57.8
12	1.4		1.4					1.4
13	2.8	1.7	4.5	32.1		1.1	5.8	43.5
14	3.3	173.8	177.1	68.7		2.0	87.5	335.3
15	5.7	29.5	35.2	29.2	0.8		28.2	93.4
16	23.7	28.6	52.3	16.1	2.3	10.4	2.4	176.9
17	27.2	172.0	199.2	54.3	13.6		30.4	297.5
18	78.3	59.5	137.8	26.9	60.8	1.6	7.3	234.4
19	5.1	31.6	36.7	98.3	133.2		1.7	269.9
20	0.1	8.8	8.9	10.7	2.6		4.4	26.6
Average								
in N.C.	23.4	52.6	76.0	41.7	22.5	6.6	17.1	163.9
Average								
Entire Area	22.7	39.8	62.5	40.2	16.9	33.2	13.1	165.9

\* See table on waterfowl location description.

\*\* -Based on Seven Inventories of Back Bay and Six of Currituck Sound.

Table \_\_\_\_\_, Pre-Season Waterfowl Days Utilization Per Acre of Back Bay, Va. and Currituck Sound, N. C.  
From September 24, 1958 to November 13, 1958.

Area No. *	DAYS PER ACRE:								
	Dabbling Duck/Days	Diving Duck/Days	Total Duck/Days	Canada Geese/Days	Brant/Days	Goot/Days	Snow Geese/Days	Swan/Days	Total Waterfowl/Days
1									
2	0.4		0.4	0.1					0.5
3	3.0		3.0	21.7					24.7
4	1.9	0.9	2.8	26.5		1.5	0.1		30.9
5	1.0		1.0	0.9		0.2			2.1
6	2.5	0.3	2.8	5.7		0.9	1.5	0.1	11.1
7	14.3	1.0	15.3	1.7		1.4			x.4
8									
Average in Va.	2.9	0.4	3.3	8.1		0.7	0.3	0.0	12.4
9	19.1		19.2	11.6		0.7			31.4
10	31.3	0.8	32.1	8.7		5.3		0.1	46.2
11	2.4		2.4						2.4
12	0.2		0.2						0.2
13	0.1		0.1	1.4					1.5
14	7.1		7.1	0.4					7.5
15	0.1		0.1	0.4					0.5
16	16.9	0.2	17.1	4.1	0.8	5.9		0.8	28.7
17				0.8					0.8
18	4.3	0.1	4.4	2.3	0.8	4.9		0.1	12.5
19	1.4		1.4	4.2		1.4			7.0
20									
Average in N.C.	5.0	0.1	5.0	2.1	0.2	1.7		0.1	9.1
Average Entire Area	4.5	0.1	4.6	3.6	0.2	1.5	0.1	0.1	10.1

\*See: Table on Waterfowl Location Description.

Table \_\_\_\_\_. Hunting Season Waterfowl Days Utilization Per Acre of Back Bay, Va. and Currituck Sound, N. C.  
From November 13, 1958 to January 17, 1959.

Area No. #	DAYS PER ACRE:								
	Dabbling Duck/Days	Diving Duck/Days	Total Duck/Days	Canada Geese/Days	Brant/Days	Coot/Days	Snow Geese/Days	Swan/Days	Total Waterfowl/Days
1	0.8		0.8						0.8
3	2.1		2.1	2.7				1.5	6.3
4	170.6	0.5	1.1	2.4		1.1		1.8	6.4
5		3.4	21.7	43.9		5.5	32.8	5.0	108.9
6	0.2		0.2	0.6					0.8
	2.7	0.5	3.1	5.8		1.0	22.2	3.7	35.8
7	9.9	2.7	12.7	11.1	1.2	6.3	58.6	9.5	99.4
3	0.2	0.1	0.3	0.1					0.4
Avg. in Va.	5.4	1.3	7.1	12.3	0.1	2.2	17.9	3.0	42.6
9	14.2	3.5	17.7	25.0	0.1	12.7	26.7	4.4	86.5
10	12.6	3.4	16.0	9.5	3.3	13.7	28.2	6.1	76.6
11	6.8	0.1	7.0				27.9	0.2	35.1
12	2.8		2.8						2.8
13	0.5	1.3	1.8	2.7	0.5		4.7	1.8	11.5
14	0.1	7.4	7.5	4.1				0.4	12.0
15	0.6	0.9	1.5	5.1				2.4	9.0
16	7.3	2.1	9.9	10.3	0.5	18.2		6.5	45.4
17		0.1	0.1	3.4				0.5	4.3
18	6.3	17.1	23.6	16.1	0.3	41.5		4.3	36.0
19	10.0	10.7	20.7	22.0		19.0		0.2	61.9
20		0.3	0.3						0.3
Avg. in - N.C.	4.0	5.0	9.0	7.7	0.3	10.9	3.6	2.1	33.6
Avg. Entire Area	4.5	4.1	8.5	3.9	0.2	3.8	7.2	2.3	35.9

\*See Table on Waterfowl Location Description.

Table      Post-Hunting Season Waterfowl Days Utilization Per Acre of Back Bay, Va. and Currituck Sound, N.C.  
From January 17, 1959 to March 26, 1959.

Area No.*	DAYS PER ACRE:								Total Waterfowl/Days
	Dabbling Duck/Days	Diving Duck/Days	Total Duck/Dam	Canada Geese/Days	Brant/Days	Coot/Days	snow Geese/Dam	Swan/Days	
1	0.8	2.2	3.0						3.0
2	1.7		1.7	12.5				1.2	15.4
3	3.8	7.6	11.4	36.9		1.1		4.7	54.1
4	8.7	0.9	9.6	15.0			7.3	1.9	33.8
5	0.1		0.1	4.0					4.1
6	4.4	0.7	5.1	11.7	0.1		45.7	3.3	65.9
7	3.9	0.1	4.0	1.6	0.1		44.5	1.8	52.0
8				0.4					0.4
Avg. in Va.	3.4	0.7	4.1	8.5		0.1	14.6	1.4	28.7
9	6.8	0.4	7.1	8.7		3.5	46.2	2.1	67.6
10	32.0	1.2	33.2	13.7		0.4		5.5	52.8
11	9.5		9.5	0.1				0.1	9.7
12	0.8		0.8						0.8
13	1.5	7.6	9.1	3.0			81.4	0.6	94.1
14	14.2	2.5	16.8	25.1				32.0	53.9
	0.4	0.3	0.6	2.7				5.0	8.3
15	12.4	8.0	20.4	26.5	0.1	2.0		19.4	68.4
17	0.4	1.0	1.5	7.5				5.6	14.6
18	18.2	5.8	24.0	14.4	0.1	33.0		5.4	76.9
19	0.8	0.9	1.7	5.1		47.7		0.2	55.7
20	0.2	0.2	0.4	0.1				0.2	0.7
Avg. in N.C.	7.7	3.0	10.7	9.7		9.4	9.6	5.1	44.5
Avg. Entire Area	6.6	2.4	9.1	9.4		7.1	10.8	4.2	40.6

\*See Table on Waterfowl Location Description.

Table, Pro-Hunting Season Waterfowl Days Utilization Per Acre of Back Bay, Va. and Currituck Sound, N. C.  
From September 19, 1959 to November 21, 1959.

Area No. *	DAYS PER ACRE:								
	Dabbling Duck/Days	Diving Duck/Days	Total Duck/Days	Canada Geese/Days	Brant/Days	Coot/Days	snow Geese/Days	Swan/Days	Total Waterfowl/Days
1	0.8		0.8	0.5					1.3
3	1.3	2.5	3.8	12.0					15.8
4	0.5		3.5	4.1					4.6
	39.8	13.3	53.6	50.6		2.5	2.6	16.8	326.3
5			0.2	0.9					1.1
6	0.2		5.2	16.5		0.1	2.3	6.1	30.2
7	8.0	0.5	8.5	4.2		3.5	1.8	1.3	19.3
3	0.3		0.3	3.0				0.9	4.2
<u>Average in Va.</u>	10.7	3.2	13.9	15.6		1.0	1.2	5.0	36.7
9	19.6	0.2	19.8	6.5		1.9		0.3	28.5
10	9.7	0.1	9.8	9.0		2.0	6.3	3.9	31.0
12	1.5		1.5	3.5				0.2	5.2
13	2.3		2.3	3.7					6.0
	0.3	0.3	0.6	7.1				0.9	8.6
15	0.1	1.6	1.7	10.9				1.0	13.6
16	20.4	0.1	0.5	5.0				0.2	5.7
		3.9	25.1	15.0		1.9		4.6	46.6
17	1.9	0.3	2.2	14.5				2.2	18.9
12	20.3	2.2	22.5	19.4		16.5		0.5	58.9
19	0.9	0.1	1.0	18.1		0.3		1.9	21.3
23	0.1		0.1	0.1				0.3	0.5
<u>Average in N.C.</u>	6.8	1.0	7.8	10.4		3.1	0.3	1.3	22.9
<u>Average Entire Area</u>	7.8	1.5	9.3	11.7		2.5	0.5	2.2	26.2

\*See Table on Waterfowl Location Description.

Table       , Hunting Season Waterfowl Days Utilization Per Acre of Back Bay, Va. and Currituck Sound, N.C.  
From November 21, 1959 to January 8, 1960.

Area No. *	DAYS PER ACRE:								
	Dabbling Duck/Days	Diving Duck/Days	Total Duck/Days	Canada Geese/Days	Brant/Days	Coot/Days	Snow Geese/Days	Swan/Days	Total Waterfowl/Days
1	4.0		4.0						4.0
	3.3	0.1	3.4	1.4				0.7	5.5
3	1.9	0.3	2.2	0.1				0.3	2.6
4	33.5	6.7	40.2	52.7		2.2	5.0	31.0	131.1
5				0.3				0.3	0.6
6	2.7		2.7	4.4			0.3	2.9	10.3
7	10.2	0.3	10.5	6.4		2.1	196.6	8.9	224.5
8	0.3		0.3	0.7				0.1	1.1
Avg. in <u>Va.</u>	9.4	1.5	10.9	13.3		10.7	24.8	8.5	58.2
9	7.7		7.7	5.0		0.4	7.8	4.1	25.0
10	10.0	0.1	10.1	3.9		1.2	7.7	2.7	25.6
11	7.9	0.1	8.0	0.2			63.3	0.1	71.6
12	4.0		4.0	0.9					4.9
13	1.2	5.7	6.9	10.7		0.1		6.6	24.3
14	0.3	26.4	26.7	35.9				11.6	74.2
15	0.6		0.6	5.0				6.2	11.8
16	4.3	0.9	5.2	7.0		2.3	3.7	6.7	24.9
17	0.5	0.6	1.1	11.3				4.1	19.5
18	22.7	12.2	34.9	10.1		43.7		3.0	91.7
19	1.0	2.7	3.7	23.3		3.2		5.1	31.3
20		0.1	0.1	0.4				1.1	1.6
Avg. in --- <u>N.C.</u>	5.5	5.4	10.9	10.7		7.7	3.7	4.1	37.1
Avg. <u>Entire Area</u>	6.5	4.4	10.9	11.4		6.0	9.0	5.2	42.5

\*See Table on Waterfowl Location Description.

Table \_\_\_\_\_, Post-Hunting Season Waterfowl Days Utilization Per Acre of Back Bay, Va. and Currituck Sound, N.C.  
from January 8, 1960 to April 8, 1960,

Area No.*	DAYS PER ACRE:								Total Waterfowl/Days
	Dabbling Duck/Days	Diving Duck/Days	Total Duck/Days	Canada Goose/Days	Brant/Days	Coot/Days	snow Geese/Days	Swan/Days	
1	15.0	0.1	15.1						15.1
2	19.5		19.5					7.1	26.6
3	1.1	1.4	1.5	13.3				9.5	25.3
5	13.5	0.2	13.7	18.3			17.6	4.7	54.1
6	0.5		0.5	3.7				0.1	4.3
	3.8	0.1	3.9	4.3			25.5	2.9	36.9
7	33.1	0.2	33.3	4.7			286.2	7.3	331.5
8	0.1		0.1						0.1
Avg. in Va.	9.0	0.1	9.1	6.7			42.6	3.1	61.5
9	14.1	1.1	15.2	13.9			183.6	22.8	235.5
10	40.6	7.5	48.1	22.4		0.1		25.5	96.1
11	13.7	5.6	19.3	4.4			34.3	1.1	59.1
12	4.6	1.0	5.6	0.1					5.7
14	0.6	5.4	6.0	8.9			2.1	1.1	18.1
15	0.1	1.6	1.7	3.9				0.3	5.9
	1.3	1.2	2.5	5.7				9.2	17.4
16	7.8	11.6	19.4	12.3			4.4	19.9	56.0
17	0.2	9.1	9.3	12.3			0.8	4.6	27.0
18	10.0	4.9	14.9	10.8		70.3		10.0	106.0
19	2.4	5.3	7.7	15.9		24.5		2.1	50.2
20	0.2	0.4	0.6	2.1				0.9	3.7
Avg. in N.C.	5.5	4.8	10.3	8.9		13.5	7.4	6.7	46.8
Avg. entire area	6.4	3.6	10.0	8.4		10.1	16.2	5.8	50.5

\*See Table on Waterfowl Location Description.

Table \_\_\_\_\_. Pre-Season Waterfowl Days Utilization Per Acre of Back Bay, Va. and Currituck Sound, N. C.  
From September 20, 1960 to November 17, 1961,

Area No. *	DAYS PER ACRE:								
	Dabbling Duck/Days	Diving Duck/Days	Total Duck/Days	Canada Goose/Days	Brant/Days	Coot/Days	Snow Goose/Days	Swan/Days	Total Waterfowl/Days
1	2.0	1.6	3.6			0.3			3.9
2	2.5		2.5	1.3					3.8
3	1.3		1.3	4.2					5.5
4	23.8	13.0	36.8	29.6		6.6		4.5	77.5
5	0.5		0.5	2.9		0.3		0.8	4.5
6	3.4		3.4	3.6					7.0
7	15.2	5.3	20.5	19.6		9.6		0.8	50.5
8	0.1		0.1						0.1
Average in Va.	3.0	3.5	11.5	10.4		2.7		1.3	25.5
9	17.4	0.5	22.4	23.2		29.4		0.1	75.1
10	31.9	2.0	33.9	31.8		4.1	12.7	3.1	85.6
11	1.8		1.8	3.9					5.7
12	0.4		0.4	1.0					1.4
13	0.1		0.1	5.2					5.3
14	0.4	19.4	19.8	3.3		0.1		0.6	23.3
15	0.6		0.6	8.1		0.2		0.4	9.3
16	9.4	0.1	9.5	19.3		13.1		5.7	47.6
17	0.5	0.3	0.8	1.2				2.7	4.7
18	11.2	2.5	13.7	30.4		15.6		1.5	61.2
19	1.2	0.2	1.4	3.5				10.2	15.0
20				2.6		0.4		0.1	3.1
Average in N.C.	4.8	2.3	7.1	11.1		4.9	0.5	2.1	25.7
Average Entire Area	5.6	2.6	8.2	10.9		4.3	0.4	1.9	25.8

\*See Table on Waterfowl Location Description.

Table       . Hunting Season Waterfowl Days Utilization Per Acre of Back Bay, Va., and Currituck Sound, N. C.  
From November 17, 1960 to January 7, 1961.

Area No. *	DAYS PER ACRE :								
	Dabbling Duck/Days	Diving Duck/Days	Total Duck/Days	Canada Geese/Days	Brant/Days	Coot/Days	Snow Geese/Days	Swan/Days	Total Waterfowl/Days
1		0.5	17.4			0.2			17.2
2	12.7		2.7	2.7				0.5	5.9
3	0.3	1.3	1.6	5.2					6.8
4	30.7	13.3	44.0	111.1		11.5	22.8	36.8	226.2
5		0.6	0.9	1.8		0.1		1.2	4.0
6	1.0	9.8	10.8	7.0		1.7		3.2	22.7
7	16.0	3.0	19.0	9.5		45.1	80.8	3.9	158.3
8	0.9		0.9						0.9
Avg. in Va.	9.7	5.1	14.8	27.4		8.3	14.8	9.4	74.7
9	32.7	0.3	33.0	0.3		33.9	16.1	0.4	83.7
10	25.9	1.0	26.9	34.2		42.8	73.8	5.2	182.7
11	4.0	0.1	4.1				4.8		8.9
13	1.8		1.8	0.3					2.1
14	1.4	4.0	5.4	21.0			8.2	0.1	34.7
	2.2	26.4	28.6	58.6		0.3		13.7	101.2
15	0.4	3.6	4.0	11.0		0.8		4.9	20.7
16	17.6	3.1	20.7	15.1		32.9	4.9	9.0	82.6
17	13.2	43.1	56.3	53.0				15.7	125.0
18	30.0	24.4	54.4	13.9		68.6		4.4	141.3
19	6.0	4.5	10.5	63.0		47.0		0.3	120.8
20				5.7				3.0	8.7
Avg. in N.C.	11.0	12.4	23.4	24.7		20.5	4.9	5.5	79.3
Avg. Entire Area	10.7	10.5	21.2	25.4		17.7	7.4	6.5	78.2

\*See Table on Waterfowl Location Description.

**Table. Post-Hunting Season Waterfowl Days Utilization Per Acre of Back Bay, Va. and Currituck Sound, N. C.  
From January 7, 1961 to April 9, 1961.**

Area No.*	DAYS PER ACRE:								
	Dabbling Duck/Days	Diving Duck/Days	Total Duck/Dam	Canada Geese/Days	Brant/Days	Coot/Days	Snow Geese/Days	Swan/Days	Total Waterfowl/Days
1	8.8	5.9	14.7			0.7			15.4
3	6.2	2.0	8.2	64.0		0.8		5.8	78.8
4	28.7 3.7	24.1	27.8	9.5		10.6		2.2	50.1
		5.1	33.8	46.1		9.1	28.8	17.9	135.7
5			0.4	44.9		3.2	6.7	8.3	63.5
6	0.4	0.7	6.6	10.0			28.2	7.8	56.0
7	17.1	1.1	18.2	2.1		23.9	149.1	5.1	198.4
8	2.9		2.9	3.5			1.8		8.2
<u>Avg. in Va.</u>	10.6	2.7	13.3	25.9		6.2	30.8	8.1	84.2
9	11.6	0.2	11.6	8.4		7.2	118.2	12.0	157.6
10	39.9	42.0	81.9	37.8		38.0	56.4	20.3	234.4
11	9.9		9.9	0.6		0.4	82.1	1.0	94.0
12	0.5		0.5	2.6					3.1
13	2.3		2.3	13.3			a.5	0.4	18.5
15	1.1		1.1	27.6		0.8		6.2	35.7
16	10.7 3.7	3.3	7.0	6.1		1.8		3.0	17.9
		7.9	18.6	9.5		3.4	73.3	14.3	119.1
17	1.5	12.9	14.4	15.9		4.2		3.2	37.7
18	8.2	14.0	22.2	8.6		47.7	0.5	7.3	86.3
19	1.1	16.0	17.1	25.7		41.0		0.2	84.0
20	0.1	0.5	0.6	7.0		8.2		0.8	16.6
<u>Avg. in N.C.</u>	5.5	7.6	13.2	13.3		15.1	16.5	5.0	63.1
<u>Avg. Entire Area</u>	6.8	6.4	13.2	16.4		12.8	20.1	5.8	68.3

\*See Table on Waterfowl Location Description.

Table . Pre-Hunting Season Waterfowl Days Utilization per Acre of Back Bay, Virginia, and Currituck Sound, North Carolina, from September 19, 1962, to November 14, 1962.

Area No. *	Dabbling		Diving		Total		Canada		Snow		Total Waterfowl Days				
	Duck	Days	Duck	Days	Duck	Days	Geese	Days	Coot	Days		Geese	Days	Swan	Days
1	0.3		0.0		0.3		0.0		0.0		0.0		0.0		0.3
2	Tr.		0.0		Tr.		3.9		0.0		0.0		0.0		3.9
3	0.1		<b>0.2</b>		0.3		<b>0.2</b>		0.0		0.0		0.0		0.5
4	80.0		30.9		110.9		93.1		3.5		1.9		4.0		213.4
5	0.1		0.0		0.1		1.0		Tr.		0.0		0.0		1.1
6	4.0		<b>0.2</b>		4.2		9.6		0.2		Tr.		0.3		14.3
7	20.1		13.4		33.5		17.2		2.4		0.0		0.1		53.2
8	0.1		<u>0.0</u>		<u>0.1</u>		<u>0.0</u>		<u>0.0</u>		<u>0.0</u>		<u>0.0</u>		<u>0.1</u>
Average in Virginia	20.7		8.4		29.1		24.5		1.1		0.4		0.9		56.0
9	3.7		Tr.		3.7		6.6		1.6		0.0		0.0		11.9
10	35.5		0.2		35.7		1.5		18.6		29.1		0.6		85.5
11	5.8		0.1		5.9		3.4		0.6		0.0		0.9		10.8
12	2.1		0.0		2.1		0.0		0.1		0.0		0.0		<b>2.2</b>
13	0.3		0.1		0.4		2.7		0.0		0.0		0.4		3.5
14	0.5		Tr.		0.5		9.0		Tr.		0.0		0.1		9.6
15	0.5		0.1		0.6		0.7		Tr.		0.0		0.1		1.4
16	12.5		0.0		12.5		9.4		0.5		0.0		1.8		24.2
17	0.7		4.7		5.4		7.4		Tr.		0.0		<b>0.2</b>		13.0
18	21.2		1.3		22.5		14.6		6.3		0.0		0.9		44.3
19	<b>0.2</b>		0.0		<b>0.2</b>		4.0		1.0		0.0		0.0		5.2
<b>20</b>	<u><b>0.2</b></u>		<u>Tr.</u>		<u>0.2</u>		<u>0.5</u>		<u>Tr.</u>		<u>0.0</u>		<u>0.4</u>		<u>1.1</u>
Average in North Carolina	6.7		0.7		7.4		6.0		2.0		1.2		0.5		17.1
Average Entire Area	10.2		2.7		12.9		10.6		1.8		1.0		0.6		26.9

\* See table on waterfowl location description.  
 Tr. = < 0.05 days/acre.

Table , Hunting Season Waterfowl Days Utilization Per Acre of Back Bay, Virginia, and Currituck Sound, North Carolina, from November 14, 1962, to January 10, 1963.

Area No.*	Dabbling Duck Days		Diving Duck Days		Total** Duck Days		Canada Geese Days		Spow Geese Days		Swan Days		Total Waterfowl Days
	Duck Days	Duck Days	Duck Days	Duck Days	Duck Days	Duck Days	Geese Days	Coot Days	Geese Days	Geese Days	Swan Days	Swan Days	
1	1.1				1.1							0.4	1.5
2	<b>0.2</b>				0.2								0.2
3	21.7		2.8		25.7		44.0					26.7	96.4
4	53.0		27.1		80.2		101.6	2.4	2.5			23.4	210.1
5	1.0		Tr.		1.0		15.9	Tr.				2.4	19.3
6	41.6		3.0		44.6		19.4					25.6	89.6
7	31.8		4.2		36.0		25.1	6.5	77.9			38.1	183.6
8	<u>0.7</u>				0.7		<u>0.3</u>					<u>0.3</u>	<u>1.3</u>
Average in Virginia	23.7		7.1		30.9		34.3	1.3	9.9			15.8	92.2
9	24.6		0.8		25.8		32.2	0.9				6.8	65.7
10	48.8		0.1		48.9		36.9	2.5	195.5			16.0	299.8
11	37.4		2.1		39.5		6.7	0.8	74.1			6.9	128.0
12	14.6		18.7		33.3		3.6	Tr.				4.9	41.8
13	1.7		0.8		2.5		18.6					3.1	24.2
14	1.3		22.8		24.1		68.8					12.5	105.4
15	1.9		21.4		23.3		5.5					8.8	37.6
16	29.5		0.1		29.6		7.1		19.5			11.9	68.1
17	1.8		8.5		10.3		33.1					7.5	50.9
18	50.2		2.8		53.4		37.2	12.9				6.5	110.0
19	6.8		2.1		8.9		46.9	7.3				0.8	63.9
20	3.2		0.1		3.3		<u>9.3</u>	<u>0.9</u>				<u>3.8</u>	<u>17.3</u>
Average in North Carolina	17.4		5.6		23.1		26.8	3.0	12.9			6.9	72.7
Average Entire Area	19.0		6.0		25.0		28.6	2.6	12.2			9.1	77.5

\* See table on waterfowl location description.

\*\* Includes Merganser days/acre.

**Table** . Post-hunting Season Waterfowl Days Utilization per Acre of Back Bay, Virginia, and Currituck Sound, North Carolina, from January 10, 1963, to April 9, 1963.

Area No.*	Days Per Acre											
	Dabbling Duck Days		Diving Duck Days		Total** Duck Days		Canada Geese Days		Snow Geese Days		Swan Days	Total Waterfowl Days
1	0.9		0.0		1.0		0.0		0.0		0.0	1.0
2	29.2		0.0		29.2		0 . 5		0.0		42.0	71.7
3	9.6		3.3		<b>13.0</b>		22.8		0.0		2.2	38.0
4	21.1		0.6		21.7		68.9		0.0	16.4	20.3	127.3
5	1.6		Tr.		1.6		9.8		0.4	185.9	0.0	197.7
6	80.2		21.2		101.4		32.7		0.4	12.1	33.6	180.2
7	31.0		Tr.		31.0		1.9		0.1	17.4	0.3	50.7
8	1.3		0.0		1.3		<u>4.3</u>		<u>0.2</u>	<u>1.3</u>	<u>0.0</u>	<u>7.1</u>
Average in Virginia	23.8		3.8		27.6		24.7		0.2	51.3	11.8	115.6
9	7.0		0.6		<b>7.6</b>		0.5		3.7	0.0	<b>0.2</b>	12.0
10	111.4		48.9		160.3		25.0		5.6	28.2	34.0	<b>253.1</b>
11	25.9		Tr.		25.9		4.0		<b>0.2</b>	129.3	2.9	162.3
12	0.9		0.0		0.9		0.0		Tr.	0.0	0.0	0.9
13	0.6		0.0		0.6		6.6		0.0	4.8	10.0	22.0
14	4.0		108.3		112.3		83.8		0.0	12.3	9.3	217.7
15	2.4		37.6		40.0		3.9		1.0	0.0	8.2	53.1
16			1.5		6.4		11.2		0.0	3.6	15.7	36.9
17	1.6		0.4		<b>2.0</b>		19.8		0.0	0.0	12.5	34.3
18	7.8		0.8		8.6		3.5		9.4	11.1	8.9	41.5
19	3.8		41.1		44.9		50.3		8.8	0.0	0.5	104.5
20	<b>0.2</b>		Tr.		0.2		<u>2.3</u>		<u>5.2</u>	<u>0.0</u>	<u>1.0</u>	<u>8.7</u>
Average in North Carolina	8.6		17.4		26.0		17.8		3.5	10.6	8.3	66.2
Average Entire Area	12.4		14.0		26.4		19.5		2.7	20.8	9.2	78.6

\* See **table** on waterfowl location description.

\*\* Includes Red-breasted Merganser.

Tr. = <0.05 days/acre

Table . Percent Frequency of Food Items Contained in the Gizzard Contents of 42 Ducks taken on Back Bay, Virginia, from 1910 - 1924.

Food Item	Percent Contained By:						Total	Dabblers
	Mallard	Black	Baldpate	Pintail	G. W. Teal			
<u>Plant Material:</u>	(2) <u>1/</u>	(10) <u>1/</u>	(4) <u>1/</u>	(10) <u>1/</u>	(5) <u>1/</u>		(31) <u>1/</u>	
<b>Ruppia</b> maritima	50	40	100	90	80		71	
Potamogeton sp.	0	40	50	90	60		58	
Scirpus americanus	0	40	50	70	60		52	
Potamogeton pectinatus	50	40	50	10	0		26	
Najas	0	40	25	50	0		32	
Polygonum sp.	50	10	25	50	0		26	
Myrica sp.	0	10	25	40	0		23	
Vallisneria americana	50	10	25	0	0		10	
Scirpus sp.	0	40	50	0	0		19	
<b>Chara</b> sp.	0	0	0	0	0		0	
Sagittaria	0	0	25	0	40		10	
Eleocharis sp.	50	10	0	0	0		6	
Cladium sp.	0	10	0	0	0		3	
Myriophyllum	0	0	0	0	0		0	
Sparganium	50	0	0	0	0		3	
Ilex	0	0	0	10	0		3	
Juncus	0	0	0	0	20		3	
Zannichellia palustris	0	0	0	0	0		0	
Hydroids	0	0	0	0	0		0	
Fimbristylis	0	0	25	0	0		3	
Potamogeton perfoliatus	0	0	0	0	0		0	
Unidentified vegetation	50	0	0	0	0		3	
<u>Animal Material:</u>								
<b>Insecta</b>	0	0	0	40	0		13	
Gastropoda	0	0	0	0	0		0	

1/ Number of each species from which the respective percents were computed.

Table . (Cont'd) Percent Frequency of Food Items Contained in the Gizzard Contents of 42 Ducks taken on Back Bay, -Virginia, from 1910 - 1924.

Food Item	Redhead	Canvasback	Ringneck	Lesser Scaup	Greater Scaup	Total Diver	Total Dabbling	Total Duck
<b>Plant Material:</b>	<b>(2)<u>1</u>/</b>	<b>(5)<u>1</u>/</b>	<b>(2)<u>1</u>/</b>	<b>(1)<u>1</u>/</b>	<b>(1)<u>1</u>/</b>	<b>(11)<u>1</u>/</b>	<b>(31)<u>1</u>/</b>	<b>(42)<u>1</u>/</b>
Ruppia maritima	100	20	50	100	0	45	71	64
Potamogeton sp.	0	4 0	50	100	0	36	58	52
Scirpus americanus	50	20	0	0	0	18	52	43
Potamogeton pectinatus	100	60	0	0	100	55	26	33
Najas	100	20	0	0	0	27	32	31
Polygonum sp.	0	20	0	0	0	9	26	21
Myrica sp.	50	0	0	0	0	9	2 3	19
Vallisneria americana	0	0	0	0	0	0	19	14
Scirpus sp.	50	0	0	0	0	9	10	10
<b>Chara</b> sp.	0	20	100	0	0	27	0	7
Sagittaria	0	0	0	0	0	0	10	7
Eleocharis sp.	0	0	0	0	0	0	6	5
Cladium sp.	0	20	0	0	0	9	3	5
Myriophyllum	0	20	0	0	0	9	0	2
Sparganium	0	0	0	-0	0	0	3	2
Ilex	0	0	0	0	0	0	3	2
Juncus	0	0	0	0	0	0	3	2
Zannichellia palustris	50	0	0	0	0	9	0	2
Hydroids	50	0	0	0	0	9	0	2
Fimbristylis	0	0	0	0	0	0	3	2
Potamogeton perfoliatus	0	0	0	0	0	0	0	0
Unidentified vegetation	50	20	50	0	0	27	3	10
<b>Animal Material:</b>								
<b>Insecta</b>	0	0	0	0	0	0	13	10
Gastropoda	50	20	0	0	0	18	0	5

1/ Number of each species from which the respective percents were computed.

Table , Percent Frequency of Food Items Contained in the Gizzard Contents of 256 Dabbling Ducks taken on Currituck Sound, North Carolina, from 1904 = 1927.

Food Item	Percent Contained By:							Total Dabblers
	Mallard	Black	Gadwall	Baldpate	Pintail	G.W. Teal	B.W. Teal	
Plant Material:	(56) <u>1</u> /	(86) <u>1</u> /	(28) <u>1</u> /	(30) <u>1</u> /	(41) <u>1</u> /	(9) <u>1</u> /	(6) <u>1</u> /	(256) <u>1</u> /
Ruppia maritima	75	67	79	90	83	100	83	77
Potamogeton sp.	79	85	14	2 7	80	56	67	67
Najas	21	14	32	7	15	0	0	16
<b>Chara sp.</b>	0	0	0	7	24	0	0	5
Potamogeton pectinatus	14	12	0	0	10	0	0	9
Scirpus sp.	73	63	7	13	2	56	33	43
Vallisneria americana	2	7	0	7	2	0	0	4
Myrica sp.	23	19	0	3	44	11	0	19
Polygonum sp.	41	22	0	3	32	22	17	23
Potamogeton perfoliatus	0	2	0	0	2	44	33	4
Eleocharis sp.	16	24	0	0	12	33	0	15
Scirpus americanus	0	0	0	0	41	0	0	7
Polygonum sagittatum	0	34	0	0	0	0	0	11
Spartina	18	14	0	0	2	0	0	9
Rhynchospora	5	8	0	0	0	0	0	4
Carex sp.	7	3	1	1	2	11	0	5
Scirpus robustus	0	0	0	0	12	0	0	2
Cladium sp.	0	3	0	0	12	0	0	3
Sagittaria	5	1	0	0	5	0	0	2
Zannichellia palustris	0	1	0	0	5	0	17	2
Rumex	0	2	0	0	5	0	0	2
Ceratophyllum	4	1	0	0	0	0	0	1
Galium	2	2	0	0	2	0	0	2
Hydrocotyle	7	2	0	0	2	11	0	3
Cyperus sp.	0	1	0	0	7	11	0	2
Panicum	4	6	0	0	2	0	0	3
Juncus	0	0	0	0	1	0	0	0
Ilex	0	0	0	0	1	0	0	0
Fimbristylis	0	2	0	0	0	0	0	1
Sparganium	0	0	0	3	0	11	17	3
Myriophyllum	0	0	0	0	0	0	0	0
Unidentified vegetation	16	16	0	10	24	33	17	16

Table (Cont'd) Percent Frequency of Food Items Contained in the Gizzard Contents of 256 Dabbling Ducks taken on Currituck Sound, North Carolina, from 1904 - 1927.

Food Item	Percent Contained By:							Total Dabblers
	Mallard	Black	Gadwall	Baldpate	Pintail	G.W. Teal	B.W. Teal	
<u>Animal Material:</u>								
Insecta	4	14	4	7	39	11	33	14
Crustacea	0	7	0	7	7	11	0	5
Gastropoda	0	6	0	0	5	0	0	3
Pelecypoda	0	1	0	0	2	0	0	1
Arachnoidea	0	1	0	0	5	0	17	2
Unidentified animal	0	0	0	0	0	0	0	0

1/ Number of each species from which the respective percents were computed.



Table . (Cont'd) Percent Frequency of Food Items Contained in the Gizzard Contents of 250 Diving Ducks taken on Currituck Sound, North Carolina, from 1904 - 1927.

Food Item	Percent Contained By:								Total Divers
	Redhead	Canvasback	Ringneck	Lesser Scaup	Greater Scaup	American Goldeneye	Ruddy	Bufflehead	
<u>Plant Material:</u>									
Fimbristylis	0	0	0	0	0	0	6	0	0
Sparganium	0	0	0	0	0	0	0	0	0
Myriophyllum	0	0	0	0	0	0	6	0	0
Unidentified vegetation	32	0	50	18	11	71	88	75	24
<u>Animal Material:</u>									
<b>Insecta</b>	0	0	0	12	5	0	75	25	12
<b>Crustacea</b>	0	0	0	5	6	43	25	0	7
Gastropoda	0	0	0	6	2	0	13:	25	5
Pelecypoda	0	0	0	8	0	14	6	0	5
Arachnoidea'	0	0	0	2	6	14	19	0	4
Unidentified animal	0	0	0	0	0	57	13	50	3

1/ Number of each species from which the respective percents were computed.

Table , Percent Frequency of Food Items Contained in the Gizzard Contents of 748 Waterfowl taken on Currituck Sound, North Carolina, from 1904 - 1927,

Food Item	Percent Contained By:					
	Total Dabblers	Total Divers	Mergansers	Total Ducks	Coots	Total Waterfowl
Plant Material:	(256) <u>1</u> /	(250) <u>1</u> /	(9) <u>1</u> /	(515) <u>1</u> /	(233) <u>1</u> /	(748) <u>1</u> /
Ruppia maritima	77	86	0	80	83	81
Potamogeton sp.	67	89	11	78	14	57
<b>Najas</b>	16	29	0	22	86	42
<b>Chara</b> sp.	5	56	0	30	61	39
Potamogeton pectinatus	9	13	0	11	69	29
Scirpus sp.	43	8	0	25	2	18
Vallisneria americana	4	27	0	15	12	14
Myrica sp.	19	13	0	16	0	11
Polygonum sp.	23	6	0	14	0	10
Potamogeton perfoliatus	4	4	0	4	12	6
<b>Eleocharis</b> sp.	1	5	1	8	0	5
Scirpus americanus	7	5	0	6	0	4
Polygonum sagittatum	11	0	0	0	0	4
Spartina	9	0	0	4	0	3
Rhynchospora	4	1	0	3	0	2
Carex sp.	5	1	0	3	0	2
<b>Scirpus robustus</b>	2	4	0	3	0	2
<b>Cladium</b> sp.	3	1	0	2	-1	2
Sagittaria	2	1	0	2	0	1
Zannichellia palustris	2	1	0	1	0	1
Rumex	2	1	0	1	0	1
Ceratophyllum	1	1	0	1	0	1
Galium	2	0	0	1	0	1
Hydrocotyle	3	0	0	2	0	1
Cyperus	2	0	0	1	0	1
Panicum	3	0	0	2	0	1
Juncus	0	0	0	0	0	0
Ilex	0	0	0	0	0	0
Fimbristylis	1	0	0	0	0	0
Sparganium	1	0	0	1	0	0

Table (Cont'd) Percent Frequency of Food Items Contained in the Gizzard Contents of 748 Waterfowl taken on Currituck Sound, North Carolina, from 1904 - 1927.

Food Item	Percent Contained By:					
	Total Dabblers	Total Divers	Total Mergansers	Total Ducks	Total Geese	Total Waterfowl
<u>Plant Material:</u>						
Myriophyllum	0	0	0	0	0	0
<b>Unidentified vegetation</b>	16	24	11	20	7	18
<u>Animal Material:</u>						
<b>Insecta</b>	14	12	11	13	0	9
<b>Crustacea</b>	5	7	0	6	0	4
Gastropoda	3	5	0	4	0	3
Pelecypoda	1	5	0	3	0	2
Arachnoidea	2	4	0	3	0	2
Unidentified animal	0	3	78	3	0	2

1/ Number of each species from which the respective percents were computed.

Table . (Cont'd) Percent Frequency of Major Food Items Contained in the Gizzard Contents of Dabbling Ducks on Back Bay, Virginia, and Currituck Sound, North Carolina; as Determined from 281 Gizzards Collected from 1904 - 1927 and from 355 Gizzards Collected from 1958 - 1961.

Dabblers	Plant Material		
	Insecta	Crustacea	Gastropoda
<u>1904 - 1927</u>			
Mallard (58) <sup>1/</sup>	3	0	0
Black (96)	13	6	5
<b>Gadwall</b> (28)	4	0	0
Baldpate (34)	6	6	0
<b>Pintail</b> (51)	39	6	4
G. W. Teal (14)	7	7	0
Total Dabbling (281)	-14	4	2
<u>1958 - 1961</u>			
Mallard (52)	2	6	0
Black (52)	2	12	0
<b>Gadwall</b> (17)	6	0	0
Baldpate (142)	1	0	0
<b>Pintail</b> (50)	2	2	12
G. W. Teal (42)	17	0	0
Total Dabbling (355)	4	3	2

<sup>1/</sup> Number of each species from which the respective percents were computed.

Table . (Cont'd) Percent Frequency of Major Food Items Contained in the Gizzard Contents of Waterfowl on Back Bay, Virginia, and Currituck Sound, North Carolina; as Determined from 775 Gizzards Collected from 1904 - 1927 and from 622 Gizzards Collected from 1958 - 1961.

Waterfowl	Animal Material		
	Insecta	Crustacea	Gastropoda
<u>1904 - 1927</u>			
Redhead (27) <sup>1/</sup>	0	0	4
Canvasback (7)	0	0	14
Ringneck (4)	0	0	0
Lesser Scaup (131)	9	4	5
Greater Scaup (65)	5	6	2
American Goldeneye (7)	0	43	0
Ruddy (16)	75	25	13
Bufflehead (4)	25	0	25
Total Diver (261)	11	6	5
Total Dabbler (281)	14	4	2
Total Duck (542)	12	5	4
Coot (233)	0	0	0
Total Waterfowl (775)	9	3	2
<u>1958 - 1961</u>			
Redhead (13)	8	0	0
Canvasback (6)	0	17	0
Ringneck (65)	3	3	6
Lesser Scaup (17)	6	6	0
Greater Scaup (7)	14	0	0
American Goldeneye (2)	0	0	0
Ruddy (55)	2	16	2
Bufflehead (12)	8	0	25
Total Diver (177)	4	7	5
Total Dabbler (355)	4	3	2
Total Duck (532)	4	4	3
Coot (90)	1	0	0
Total Waterfowl (622)	3	4	2

<sup>1/</sup> Number of each species from which the respective percents were computed.

Table . Estimated Average Pounds (dry-weight) of Food Annually Consumed by Waterfowl on Back Bay, Virginia and Currituck Sound, North Carolina, During the Period 1962-63; Based on Data from Food Habit Study Weighted by Waterfowl Days Utilization.

Species	Dabblers	Divers	Total Duck	Coot	Canada Geese	W. Swan	Total Waterfowl	% Volume
<i>Najas guadalupensis</i>	257,117	74,279	331,396	110,304	2,470,208	2,365,412	59277,320	41.19
<i>Ruppia maritima</i>	206,007	111,964	317,971	2,204	879,800	316,470	1,516,445	11.84
<i>Potamogeton perfoliatus</i>	33,657	177,197	210,854	735	216,566	405,731	833,886	6.51
<i>Potamogeton pectinatus</i>	76,279	147,030	223,309	1,714	121,818	462,533	809,374	6.32
<i>Vallisneria americana</i>	20,781	177,253	198,034	1,347	33,838	336,757	5699976	4.45
<i>Zea mays</i>	13,995	1,339	15,334		304,546		319,880	2.50
<i>Scirpus americanus</i>	60,730	1,085	61,815		128,586	24,344	214,745	1.63
<i>Scirpus olneyi</i>	62,575	392	62,967		142,122		205,089	1.60
<i>Chara</i> spp.	12,302	6,043	18,345	4,040	74,445	979375	1949205	1.52
<i>Scirpus robustus</i>	46,265	3	40,268		128,586		174,854	1.36
<i>Distichlis spicata</i>	20,585	3	20,588		108,283		128,871	1.01
<i>Cyperus</i> spp.	70	124	194		121,818		122,012	0.95
Gramineae (Unident.)					94,748		94,748	0.74
<i>Trifolium</i> spp.					67,677		67,677	0.53
<i>Myrica cerifera</i>	11,399	252	11,651			48,688	609339	0.47
<i>Eleusine indica</i>					47,374		47,374	0.37
<i>Scirpus validus</i>	34,642	127	34,769		6,767		41,536	0.32
<i>Sagittaria subulata</i>	7,074	155	7,229	245	33,838		41,312	0.32
<i>Eleocharis palustris</i>	5,677		5,677	122	33,838		39,637	0.31
<i>Eleocharis parvula</i>	14,049	124	14,173	857	20,303		35,333	0.28
<i>Stellaria</i> spp.					33,838		33,838	0.26
<i>Digitaria ischaemum</i>					27,071		27,071	0.21
<i>Echinochloa walteri</i>	22,376	124	22,500				22,500	0.18
<i>Myrica pensylvanica</i>	15,348	277	15,625		6,767		22,392	0.17
<i>Cyperus compressus</i>					139535		139535	0.11
<i>Nitella</i> spp.					13,535		139535	0.11
<i>Cladium jamaicensis</i>	11,245	886	12,131				12,131	0.09
<i>Cyperus odoratus</i>	11,234		11,234				11,234	0.09
<i>Polygonum punctatum</i>	10,264	124	10,388				10,388	0.08
<i>Melilotus alba</i>		9,340	9,340				99340	0.07
<i>Salicornia</i> spp.	9,191		9,191				9,191	0.07
<i>Polygonum densiflorum</i>	7,924		7,924				7,924	0.06
<i>Carex</i> spp.	5		5		6,767		6,772	0.05
<i>Ambrosia artemisiaefolia</i>					6,767		6,767	0.05

( Cont'd )

Table . Estimated Average Pounds (dry-weight) of Food Annually Consumed by Waterfowl on back bay, Virginia and Currituck Sound, North Carolina, During the Period 1962-63; based on Data from Food habit Study weighted by Waterfowl Days Utilization. ( Cont'd. )

Species	Dabblers	Divers	Total Duck	Coot	Canada	Geese	W. swan	Total Waterfowl	% Volume
Digitaria sanguinalis						6,767		6,767	0.05
Ipomoea lacunosa						6,767		6,767	0.05
Potamogeton berchtoldii	4,464	124	4,588					4,588	0.04
Eleocharis olivacea	4,275		4,279					4,279	0.03
Zannichellia palustris	3,835		3,835					3,835	0.03
Najas spp.	3,832		3,832					3,832	0.03
Nymphaea odorata		3,597	3,597					3,597	0.03
Iris spp.	3,023		3,023					3,023	0.02
Panicum dichotomiflorum	1,402		1,402					1,402	0.01
Eleocharis spp.	1,358		1,358					1,358	0.01
Eleocharis palustris (type)	1,344		1,344					1,344	0.01
Spartina cynosuroides	1,328		1,328					1,328	0.01
Lippia nodiflora	1,322		1,322					1,322	0.01
Smilax spp.	1,236		1,236					1,236	0.01,
Proserpinaca palustris	1,232		1,232					1,232	0.01
Eleocharis quadrangulata	887	248	1,135					1,135	0.01
Brasenia schreberi		1,116	1,116					1,116	0.01
Polygonum pensylvanicum	1,112		1,112					1,112	0.01
Algae	1,096		1,096					1,096	0.01
Characeae		992	992					992	0.01
Sparganium americanum	725	248	973					973	0.01
Polygonum hydropiperoides	852		892					892	0.01
Potamogeton spp.		726	726					726	0.01
Bacopa monniera	657		657					657	0.01
Polygonum setaceutn	574		574					574	Trace
Carpinus caroliniana	472		472					472	Trace
Andropogon spp.	426		426					426	Trace
Fimbristylis (caroliniana?)	426		426					426	Trace
Leptochloa fascicularis	426		426					426	Trace
Myriophyllum (exalbescens) type	426		426					426	Trace
Polygonum hydropiper	426		426					426	Trace
Potamogeton berchtoldii (type)		372	372					372	Trace

( Cont'd )

Table . Estimated Average Pounds (dry-weight) of Food Annually Consumed by Waterfowl on Sack Bay, Virginia and Currituck Sound, North Carolina, During the Period 1962-63; Based on Data from Food Habit Study Weighted by Waterfowl Days Utilization. ( Cont'd. )

Species	Dabblers	Divers	Total Duck	Coot	Canada	Geese	W. swan	Total Waterfowl	% Volume
Eleocharis albida	353		353					353	Trace
<b>Euphorbia</b> spp.	350		350					350	Trace
Paspalum boscianum	350		350					350	Trace
Nyssa biflora	210	134	344					344	Trace
Cuscuta spp.	300		300					300	Trace
<b>Myriophyllum pinnatum</b>	300		300					300	-Trace
Paspalum distichum	274		274					274	Trace
<b>Myriophyllum (spicatum?)</b>		248	248					248	Trace
Polygonum <b>amphibium</b>		248	248					248	Trace
Juncus roemerianus	210		210					210	Trace
Vitis spp.	210		210					210	Trace
Descurainia <b>pinnata</b>		124	124					124	Trace
Galium spp.		124	124					124	Trace
Panicum <b>capillare</b>		124	124					124	Trace
<b>Cyperus polystachys</b>	70		70					70	Trace
<b>Hordeum vulgare</b>	70		70					70	Trace
Rubus spp.	70		70					70	Trace
Rumex spp.	70		70					70	Trace
Crataegus spp.	53		53					53	Trace
<b>Fimbristylis castanea</b>	26		26					26	Trace
Unidentified vegetation	30,687	2,528	33,215		1,590,408			1,623,623	12.67
<b>Total Vegetation</b>	<b>1,041,594</b>	<b>719,074</b>	<b>1,760,668</b>	<b>121,568</b>	<b>6,747,383</b>	<b>4,057,310</b>		<b>12,686,929</b>	<b>99.03</b>
Pelecypoda	77,729	21,912	99,641	857				100,498	0.78
(Rangia cuneata)	(70,563)	(19,458)	(90,021)	(857)				(90,878)	(0.71)
(Mytilopsis leucopheata)	(70)	(56)	(126)					(126)	Trace
Gastropoda	3,897	1,400	5,297					5,297	0.04
Amphipoda	2,307	952	3,259					3,259	0.03
(Gammarus spp.)	(2,254)	(921)	(3,175)					(3,175)	(0.02)
Isopoda		124	124					124	Trace
(Cyathura polita)		(124)	(124)					(124)	Trace
Pisces	9,950		9,950					9,950	0.08

( Cont'd )

Table . **Estimated Average Pounds (dry-weight) of Food Annually Consumed by Waterfowl on Back Bay, Virginia and Currituck Sound, North Carolina, During the Period 1962-63; Based on Data from Food Habit Study Weighted by Waterfowl Days Utilization. (Cont'd.)**

Species	Dabblers	Divers	'Total Duck	Coot	Canada	Geese	W. swan	Total Waterfowl	% Volume
<b>Insecta</b>	3,723	1,376	5,099					5,099	0.04
(Coleoptera)	(274)		(274)					(274)	Trace
<b>(Corixidae)</b>	(26)		(26)					(26)	Trace
(Diptera)	(822)		(822)					(822)	(0.01)
(Formicidae)	(822)		(822)					(822)	(0.01)
(Odonata)	(822)	(1,366)	(2,188)					(2,188)	(0.02)
Unidentified animal	140		140					140	Trace
<b>Total Animal</b>	97,746	25,764	123,510	857				124,367	0.97
<b>'Total Food</b>	1,139,340	744,838	1,884,178	122,425	6,747,383	4,057,310		12,811,296	100.00

**Note:** Total Duck does not include B.W. Teal, American Scoter, or Mergansers.  
American Brant, Blue Geese, and Snow Geese not included.

Table . Estimated Average Pounds of Food (dry-weight) Annually Consumed by Waterfowl on Back Bay, Virginia, and Currituek Sound, North Carolina, During the Period 1958-1961; Based on Data from Food Habit Studies Weighted by Waterfowl Days Utilization

Species	Dabbling Ducks	Diving Ducks	Mergansers	Total Ducks	Coot	Canada Geese	Whistling Swan	Total Waterfowl	% of Total.
<i>Zea mays</i>	25,754	31,430		57,184		2,767,961		2,825,145	31.12
<i>Potamogeton perfoliatus</i>	44,902	31,569		76,471	477	48,222	2,561,305 *	2,686,475	29.59
<i>Najas guadalupensis</i>	185,991	49,530		235,521	461,375	858,357	143,347	1,698,600	18.71
<i>Potamogeton pectinatus</i>	29,245	108,036		137,281	4,290	120,556		262,127	2.89
<i>Panicum amarum</i>						221,822		221,822	2.44
<i>Ruppia maritima</i>	47,761	61,711		109,472		91,622		201,094	2.22
<i>Digitaria spp.</i>						130,200		130,200	1.43
<i>Digitaria sanguinalis</i>						125,378		125,378	1.38
<i>Glycine max</i>	174			174		101,267		101,441	1.12
Gramineae (unidentified)						91,622		91,622	1.01
<i>Vallisneria americana</i>	8,635	49,310		57,945	3,336	4,822		66,103	0.73
<i>Hordeum vulgare</i>						57,867		57,867	0.64
<i>Scirpus olneyi</i>	45,171	2,313		47,484		4,822		52,306	0.58
<i>Scirpus americanus</i>	16,780	9,437		26,217		9,644		35,861	0.40
<i>Chara spp.</i>	14,044	8,907		22,951	1,430	4,822		29,203	0.32
<i>Sagittaria subulata</i>						28,933		28,933	0.32
<i>Trifolium repens</i>						28,933		28,933	0.32
<i>Polygonum punctatum</i>	24,748	813		25,561				25,561	0.28
<i>Eleocharis quadrangulata</i>	14,596	419		15,015		9,644		24,659	0.27
<i>Digitaria ischaemum</i>	542			542		19,289		19,831	0.22
<i>Cladium jamaicense</i>	11,703	3,761		15,464				15,464	0.17
<i>Bacopa monnieri</i>	42			42		14,467		14,509	0.16
<i>Nitella spp.</i>	10,246			10,246	3,813			14,059	0.15
<i>Sorghum vulgare</i>	13,903	162		14,065				14,065	0.15
<i>Scirpus fluviatilis</i>		9,073		9,073		4,822		13,895	0.15
<i>Potamogeton berchtoldi</i>	10,701	486		11,187				11,187	0.12
<i>Myrica cerifera</i>	7,428	2,942		10,370				10,370	0.11
<i>Carex spp.</i>	8,004			8,004				8,004	0.09
<i>Scirpus validus</i>	2,697	162		2,859		4,822		7,681	0.08
<i>Cyperus esculentus</i>	2,607			2,607		4,822		7,429	0.08
<i>Triticum aestivum</i>		7,291**		7,291				7,291	0.08
<i>Amaranthus viridis</i>	6,548			6,548				6,548	0.07
<i>Distichlis spicata</i>	5,617	648		6,265				6,265	0.07

\* Only one swan gizzard.

\*\* Waterfowl species not included or accounted for in food habit study.

Table cont. Estimated Average Pounds of Food (dry-weight) Annually Consumed by Waterfowl on Back Bay, Virginia, and Currituck Sound, North Carolina, During the Period 1958-61; Based on Data from Food Habit Studies Weighted by Waterfowl Days Utilization.

Species	Dabbling Ducks	Diving Ducks	Mergansers	Total Ducks	coot	Canada Geese	Whistling Swan	Total Waterfowl	% of Total
Zostera marina		5,994		5,994				5,994	0.07
Polygonum densiflorum	5,387	335		5,722				5,722	0.06
Digitaria serotina						4,822		4,822	0.05
Scirpus robustus	3,555	162		3,717	477			4,194	0.05
Polygonum setaceum	3,476	79		3,555				3,555	0.04
Myrica pennsylvanica	2,227	1,265		3,492				3,492	0.04
Eleocharis parvula	2,488	590		3,078				3,078	0.03
Polygonum amphibium	2,999			2,999				2,999	0.03
Sparganium americanum	1,894	325		2,219	477			2,696	0.03
Polygonum hydropiper	2,614			2,614				2,614	0.03
Polygonum arifolium	2,424	1		2,425				2,425	0.03
Nyssa aquatica	2,263			2,263				2,263	0.02
Nymphaea odorata		2,093		2,093				2,093	0.02
Polygonum sagittatum	1,771	162		1,933				1,933	0.02
Proserpinaca palustris	1,915			1,915				1,915	0.02
Eleocharis olivacea	1,838			1,838				1,838	0.02
Paspalum distichum	1,714			1,714				1,714	0.02
Cyperus spp.	1,357			1,357				1,357	0.01
Cyperus odoratus	1,148			1,148				1,148	0.01
Polygonum hydropiperoides	964	9		973				973	0.01
Algae	954		2	956				956	0.01
Myriophyllum spicatum					953			953	0.01
Rhus copallina		810		810				810	0.01
Eleocharis palustris	748			748	48			796	0.01
Potamogeton pusillus		670		670				670	0.01
Berchemia scandens		648		648				648	0.01
Carpinus caroliniana	269	324		593				593	0.01
Aneilema keisak	584			584				584	0.01
Ceratophyllum demersum	351	162		513				513	0.01
Echinochloa walteri	506			506				506	0.01
Panicum dichotomiflorum	506			506				506	0.01
Paspalum laeve	428			428				428	0.01
Phytolacea americana		324		324				324	--
Ilex opaca	273			273				273	--

\* Only one swan gizzard.

\*\* Waterfowl species not included or accounted for in food habit study.

**Table**      **Cont.**      Estimated Average Pounds of **Food** (dry-weight) Annually Consumed by Waterfowl on Back Bay, Virginia, and **Currituck** Sound, North Carolina, During the Period 1958-61; Based on Data from Food Habit **Studies** Weighted by Waterfowl Days Utilization,

	Dabbling Ducks	Diving Ducks	Mergansers	Total Ducks	coot	Canada Geese	Whistling Swan	Total Waterfowl	% of Total
<i>Decodon verticillatus</i>	269			269				269	--
<i>Polygonum verticillatus</i>	201			201				201	--
<i>Hippuris vulgaris</i>		162		162				162	--
<i>Potamogeton gramineus</i>		162		162				162	--
<i>Smilax spp.</i>		162		162				162	--
<i>Ilex spp.</i>	156			156				156	--
<i>Solanum carolinense</i>	117			117				117	--
<i>Leptochloa fascicularis</i>	102			102				102	--
<i>Cornus spp.</i>	78			78				78	--
<i>Panicum ramosum</i>	78			78				78	--
<i>Quercus spp.</i>	26			26				26	--
<i>Nyssa sylvatica var. biflora</i>	18			18				18	--
<i>Fimbristylis castanea</i>	13			13				13	--
<i>Ilex vomitoria</i>		13		13				13	--
<i>Sacciolepis striata</i>	3			3				3	--
<i>Carex comosa</i>	1			1				1	--
Unidentified vegetation	22,267	40,448	2	62,717		62,689		125,406	1.38
<b>Total Vegetation</b>	<b>605,821</b>	<b>432,900</b>	<b>4</b>	<b>1,038,725</b>	<b>476,628</b>	<b>4,822,227</b>	<b>2,704,652</b>	<b>9,042,232</b>	<b>99.60</b>
Amphipoda	2,376	13,480		15,856				15,856	0.17
Gastropoda - <i>Gyraulus spp.</i>	1,378	277		1,655				1,655	0.02
Unidentified insects	1,608			1,608				1,608	0.02
Decapoda - <i>Palaemonetes spp.</i>	351			351				351	--
Hydracarina spp.	3	247		250				250	--
Pelecypoda		168		168				168	--
Pisces			160	160				160	--
Odonata		84		84				84	--
Hymenoptera		81		81				81	--
Unidentified -insect eggs?	64			64				64	--
Hemiptera - <i>Belestome spp.</i>		49		49				49	--
Isopoda		26		26				26	--
Pormicidae	13			13				13	--

\* Only one swan gizzard.

\*\* Waterfowl species not included or accounted for in food habit study.

Table cont. Estimated Average Pounds of Food (dry-weight) Annually Consumed by Waterfowl on Back Bay, Virginia, and Currituck Sound, North Carolina, During the Period 1958-61; Based on Data from Food Habit Studies Weighted by Waterfowl Days Utilization.

Species	Dabbling Ducks	Diving Ducks	Mergansers	Total Ducks	Coot	Canada Geese	Whistling Swan	Total Waterfowl	% of Total
Coleoptera	13			13				13	--
Unidentified animal	<u>173</u>	<u>15,946</u>	--	<u>16,119</u>				<u>16,119</u>	<u>0.18</u>
Total Animal	5,979	30,358	160	36,497				36,497	0.40
Total Food	611,800	463,258	164	1,075,222	476,628	4,822,227	2,704,652	9,078,729	100.00
Blue-winged Teal**	6,225			6,225				6,225	
Scoter		58		58				58	
Unidentified Duck				3,495				3,495	
Tree Duck				35				35	
Snow Geese								2,534,185	
American Brant								8,090	
Blue Geese	<u>618,025</u>	<u>463,316</u>	<u>164</u>	<u>1,085,035</u>	<u>476,628</u>	<u>4,822,227</u>	<u>2,704,652</u>	<u>11,630,830</u>	

\* Only one swan gizzard.

\*\* Waterfowl species not included or accounted for in food habit study

Table . Estimated Average Pounds (dry-weight) of Food Annually Consumed by Dabbling Ducks on Back Bay, Virginia and Currituck Sound, North Carolina, During the Period 1962-63; Based on Data from Food Habit Studies Weighted by Waterfowl Days Utilization.

Species	Mallard	Black	Gadwall	Pintail	G.W.Teal	'American Widgeon	Shoveler	Wood Duck	Total Dabbling	% Volume
<i>Najas guadalupensis</i>	13,434	44,675		27,122	289	171,597			257,117	22.57
<i>Ruppia maritima</i>	4,128	33,590	3,937	44,107	2,156	117,521	568		206,007	18.08
<i>Potamogeton pectinatus</i>	5,598	41,652	18	25,478	552	2,981			76,279	6.70
<i>Scirpus olneyi</i>	1,609	26,536	36	27,943	3,470	2,981			62,575	5.49
<i>Scirpus americanus</i>	5,947	6,718	23	24,108	1,367	22,567			60,730	5.33
<i>Scirpus robustus</i>	6,437	20,154	250	10,136	1,868	8,090	330		46,265	4.06
<i>Scirpus validus</i>	2,519	12,764	45		2,603	3,832	3		34,642	3.04
<i>Potamogeton perfoliatus</i>	2,589	6,382	91	12,876	4,109	473	20,013		33,657	2.95
<i>Echinochloa walteri</i>	3,568	13,772		4,931	105				22,376	1.96
<i>Vallisneria americana</i>	1,469	1,680		4,383	263	12,774	212	13	20,781	1.82
<i>Distichlis spicata</i>	1,259	9,405	114	5,753	1,446	2,129	479		20,585	1.81
<i>Myrica pensylvanica</i>	280	2,687		7,671	26	4,684			15,348	1.35
<i>Eleocharis parvula</i>	350	2,687		6,301	4,285	426			14,049	1.23
<i>Zea mays</i>	1,329	8,062		3,287	447			870	13,995	1.23
<i>Chara</i> spp.	420	4,367		6,849	237	426	3		12,302	1.08
<i>Myrica cerifera</i>	1,749	5,710			105				11,399	1.00
<i>Cladium jamaicensis</i>	210	3,023			631	7,239	142		11,245	0.99
<i>Cyperus odoratus</i>	560	2,015		7,397	1,262				11,234	0.99
<i>Polygonum punctatum</i>	560	8,398		1,096	210				10,264	0.90
<i>Salicornia</i> spp.				3,561	946	4,684			9,191	0.81
<i>Polygonum densiflorum</i>	2,309	4,367		822		426			7,924	0.70
<i>Sagittaria subulata</i>		5,374		822	26	852			7,074	0.62
<i>Eleocharis palustris</i>	70			3,835	920	852			5,677	0.50
<i>Potamogeton berchtoldii</i>	210	3,023		274	105	852			4,464	0.39
<i>Eleocharis olivacea</i>		2,015		1,370	894				4,279	0.38
<i>Zannichellia palustris</i>				3,835					3,835	0.34
<i>Najas</i> spp.						3,832			3,832	0.34
<i>Iris</i> spp.	210	3,023							3,023	0.27
<i>Panicum dichotomiflorum</i>	350	1,008	1,008		184				1,402	0.12
<i>Eleocharis</i> spp.									1,358	0.12
<i>Eleocharis palustris</i> (type)		1,344							1,344	0.12
<i>Spartina cynosuroides</i>	140	336				852			1,328	0.12
<i>Lippia nodiflora</i>				822	500				1,322	0.12
<i>Smilax</i> spp.	140			1,096					1,236	0.11
<i>Froserpinaca palustris</i>	560	672							1,232	0.11

Table . (Cont'd) Estimated Average Pounds (dry-weight) of Food Annually Consumed by Dabbling Ducks on Back Bay, Virginia and Currituck Sound, North Carolina, During the Period 1962-63; Based on Data from Food Habit Studies Weighted by Waterfowl Days Utilization.

Species	Mallard	Black Gadwall	Pintail	G.W.Teal	American Widgeon	Shoveler	Wood Duck	Total Dabbling	% Volume	
Polygonum pensylvanicum	140	672	274	26				1,112	0.10	
Algae			1,096					1,096	0.10	
Polygonum hydropiperoides	70		822					892	0.08	
Eleocharis quadrangulata	560		274	53				887	0.08	
Sparganium americanum	350	336		26				725	0.06	
Bacopa monniera				657				657	0.06	
Polygonum setaceum			548	26				574	0.05	
Carpinus caroliniana							472	472	0.04	
Andropogon spp.					426			426	0.04	
Fimbristylis (caroliniana?)					4	2	6	426	0.04	
Leptochloa fascicularis					426			426	0.04	
Myriophyllum exalbescens(type)					426			426	0.04	
Polygonum hydropiper					426			426	0.04	
Eleocharis albida			274	79				353	0.03	
Euphorbia spp.	350							350	0.03	
Paspalum boschianum	350							350	0.03	
Cuscuta spp.			274	26				300	0.03	
Myriophyllum pinnatum			274	26				300	0.03	
Paspalum distichum			274					274	0.02	
Juncus roemerianus				210				210	0.02	
Nyssa biflora	210							210	0.02	
Vitis spp.	210							210	0.02	
Cyperus spp.	70							70	0.01	
Cyperus polystachys	70							70	0.01	
Hordeum vulgare	70							70	0.01	
Rubus spp.	70							70	0.01	
Rumex spp.	70							70	0.01	
Crataegus spp.				53				53	Trace	
Fimbristylis castanea				26				26	Trace	
Carex spp.			5					5	Trace	
Unidentified vegetation	2,029	1,680	18	4,657	526	21,716	61	30,687	2.69	
Total Vegetation	62,623	279,135	4,537	252,586	26,104	413,456	1,737	1,416	1,041,594	91.42

Table . **Estimated** Average Pounds (dry-weight) of Food Annually Consumed by Dabbling Ducks on Back Bay, Virginia and **Currituck** Sound, North Carolina, During the Period **1962-63**; Based on Data from Food Habit Studies Weighted by **Waterfowl** Days Utilization. (Cont'd.)

Species	Mallard	Black Gadwall	Pintail	G.W.Teal	American Widgeon	Shoveler	Wood Duck	Total Dabbler	% Volume
Pelecypoda	7,067	54,752	12,876	53	2,981			77,729	6.82
(Rangia cuneata)	(5,947)	(48,706)	(12,876)	(53)	(2,981)			(70,563)	(6.19)
(Mytilopsis leucopheata)	(70)							(70)	(0.01)
Pisces		1,008			8,942			9,950	0.87
Gastropoda		336	3,561					3,897	0.34
Insecta			2,740	131	852			3,723	0.33
(Coleoptera)			(274)					(274)	(0.02)
(Corixidae)				(26)				(26)	Trace
(Diptera)			(822)					(822)	(0.07)
(Formicidae)			(822)					(822)	(0.07)
(Odonata)			(822)					(822)	(0.07)
Amphipoda		336	1,918	53				2,307	0.20
(Gammarus spp.)		(336)	(1,918)					(2,254)	(0.20)
Unidentified animal	140							140	0.01
Total Animal	7,207	56,432	21,095	237	12,775			97,746	8.58
Total Food	69,830	335,567	4,537	273,681	26,341	426,231	1,737 1,416	1,139,340	100.00

**Table . Estimated Average Pounds (dry-weight) of Food Annually Consumed by Diving Ducks on Back Bay, Virginia, and Currituck Sound, North Carolina, During the Period 1962-63; Based on Data from Food Habit Studies Weighted by Waterfowl Lays Utilization.**

Species	Redhead	Canvasback	Ringneck	Greater & Lesser Scaup *	American Goldeneye	Ruddy	Eufflehead	Total Diver	% Volume
Vallisneria americana		159,709	8,558	485		8,462	39	177,253	23.79
Pctamogeton perfoliatus	1,321	151,303	20,342	775	2	3,446	8	177,197	23.79
Potamogeton pectinatus	26,320	75,185	35,722	1,957		7,813	33	147,030	19.74
Ruppia maritima	16,188	71,449	19,102	455	12	4,708	50	111,964	15.03
Najas guadalupensis	66,295		6,698	979		307		74,279	9.97
Helilolus alba		9,340						9,340	1.25
Charo spp.			1,861	455		3,685	42	6,043	0.81
Nymphaea odorata			3,597					3,597	0.48
Zea mays (Bait)			496	843				1,339	0.18
brasenia schreberi			1,116					1,116	0.15
Scirpus americanus			744	136		205		1,085	0.15
Characeae			992					992	0.13
Cladium jamaicensis			744	39		102	1	886	0.12
Potamogeton spp.			248			478		726	0.10
Scirpus olneyi			372	19			1	392	0.05
Potamogeton berchtoldii(type)			372					372	0.05
Myrica pensylvanica			248	29				277	0.04
Myrica cerifera			248		2		2	252	0.03
Echinochloa walteri			124					124	0.02
Eleocharis quadrangulata			248					248	0.03
Myriophyllum (spicatum?)			248					248	0.03
Polygonum amphibium			248					248	0.03
Sparganium americanum			248					248	0.03
Sagittaria subulata				155				155	0.02
Nyssa biflora			124	10				134	0.02
Scirpus validus			124				3	127	0.02
Cyperus spp.			124					124	0.02
Descurainia pinnata			124					124	0.02
Eleocharis parvula			124					124	0.02
Galium spp.			124					124	0.02
Panicum capillare			124					124	0.02
Polygonum punctatum			124					124	0.02

\* Scaup combined on aerial inventories.

Table (Cont'd) Estimated Average Pounds (dry-weight) of Food Annually Consumed by Diving Ducks on Back Bay, Virginia and Currituck sound, North Carolina, During the Period 1962-63; Based on Data from Food Habits Studies Weighted by Waterfowl Days Utilization.

Species	Redhead	Canvasback	Ringneck	Greater & Lesser Scaup *	American Goldeneye	Ruddy	Bufflehead	Total Diver	% Volume
Potamogeton berchtoldii			12.4					124	0.02
Distichlis spicata							3	3	Trace
Scirpus robustus							3	3	Trace
Unidentified vegetation			1,240	455		819	14	2,528	0.34
<b>Total Vegetation</b>	<b>110,124</b>	<b>466,986</b>	<b>104,932</b>	<b>6,792</b>	<b>16</b>	<b>30,025</b>	<b>199</b>	<b>719,074</b>	<b>96.53</b>
Felecyopoda			15,877	2,762		3,105	168	21,912	2.94
(Rangia cuneata)			04,140	(2,364)		(2,798)	(156)	(19,458)	(2.61)
(Mytilopsis leucopheata)				(10)		(34)	(12)	(56)	(0.01)
Gastropoda			1,240	136			2	1,500	0.19
Insecta			1,364	10			(2)	(1,366)	0.18
(Odonata)			(1,364)						(0.18)
Amphipoda						921	31	952	0.13
(Gammarus spp.)						(921)		(921)	(0.12)
Isoopoda			124					124	0.02
(Cyathura polita)			(124)					(124)	(0.02)
<b>Total Animal</b>			<b>18,605</b>	<b>2,908</b>		<b>4,026</b>	<b>225</b>	<b>25,764</b>	<b>3.46</b>
<b>Total Food</b>	<b>110,124</b>	<b>466,986</b>	<b>123,537</b>	<b>9,700</b>	<b>16</b>	<b>34,051</b>	<b>424</b>	<b>744,838</b>	<b>99.99</b>

\* Greater and Lesser Scaup combined on aerial inventories.

Table

cont.

Estimated Average Pounds (dry-weight) of Food Annually Consumed by Dabbling Ducks on Back Bay, Virginia, and Currituck Sound, North Carolina, During the Period 1958-61; Based on Data from Food Habit Studies Weighted by Waterfowl Days Utilization.

Species	Mallard	Black,	Gadwall	Baldpate	Pintail
<i>Najas guadalupensis</i>	2,493	12,686	1,542	140,831	28,375
<i>Ruppia maritima</i>	779	1,216	81	40,314	5,284
<i>Scirpus olneyi</i>	3,895	22,940		2,688	13,671
<i>Potamogeton perfoliatus</i>	584	9,558		24,995	9,765
<i>Potamogeton pectinatus</i>	3,116	7,125		12,094	6,778
<i>Zea mays</i>	1,909	17,900		5,644	
<i>Polygonum punctatum</i>	4,402	20,333			
<i>Scirpus americanus</i>	195	1,738		538	11,028
<i>Eleocharis quadrangulata</i>	740	12,513		806	460
<i>Chara</i> spp.	273			13,707	
<i>Sorghum vulgare</i>		13,903			
<i>Cladium jamaicense</i>	1,831	6,430		3,225	115
<i>Potamogeton berchtoldi</i>	117			538	9,995
<b>Nitella</b>				10,213	
<i>Vallisneria americana</i>		2,607		5,913	115
<i>Carex</i> spp.	428				4,940
<i>Myrica cerifera</i>	818	2,433		1,075	3,102
<i>Amaranthus viridis</i>					6,548
<i>Distichlis spicata</i>		5,387			230
<i>Polygonum densiflorum</i>		5,387			
<i>Scirpus robustus</i>	1,208	1,564			689
<i>Polygonum setaceum</i>		3,476			
<i>Polygonum amphibium</i>	2,999				
<i>Scirpus validus</i>	428	521	51	1,075	
<i>Polygonum hydropiper</i>		2,607			
<i>Cyperus esculentus</i>		2,607			
<i>Eleocharis parvula</i>			177		2,298
<i>Polygonum arifolium</i>	1,208	1,216			
<i>Nyssa aquatica</i>	351	1,912			
<i>Myrica pennsylvanica</i>	39	348			1,838
<i>Proserpinaca palustris</i>	351	1,564			
<i>Sparganium americanum</i>	156	1,738			
<i>Eleocharis olivacea</i>					1,723
<i>Polygonum sagittatum</i>	1,597	174			
<i>Paspalum distichum</i>				269	1,034
<i>Cyperus</i> spp.					
<i>Cyperus odoratus</i>					1,148
<i>Polygonum hydropiperoides</i>		348			
Algae		521	272		
<i>Eleocharis palustris</i>	195	348			
<i>Aneilema keisak</i>	584				
<i>Digitaria ischaemum</i>	273				
<i>Echinochloa crusgalli</i>	506				
<i>Panicum dichotomiflorum</i>	506				
<i>Paspalum laeve</i>	428				
<i>Ceratophyllum demersum</i>	350				
<i>Ilex opaca</i>	273				

**Table** cont. Estimated Average Pounds (dry-weight) of Food Annually Consumed by Dabbling Ducks on Back Bay, Virginia, and Currituck Sound, North Carolina, During the Period 1958-61; Based on **Data from** Food Habit Studies Weighted by Waterfowl Days Utilization.

Species	Mallard	Black	Gadwall	Baldpate	Pintail
Carpinus caroliniana				269	
<b>Decodon</b> verticillatus					
Polygonum pennsylvanicum		174			
Glycine max		174			
Ilex spp.	156				
<b>Solanum</b> carolinense	117				
Leptochloa fascicularis					
<b>Cornus</b> spp.	78				
Panicum ramosom	78				
Bacopa monnieri			42		
Quercus spp.					
Nyssa sylvatica var. biflora					
Fimbristylis <b>castanea</b>					
Sacciolepis striata					
Carex comosa					
Unidentified Vegetation	<u>5,025</u>	<u>10,080</u>	<u>158</u>	<u>4,031</u>	<u>2,872</u>
Total Vegetation	38,486	171,528	2,323	268,225	112,008
Amphipoda	117	2,259			
Unidentified insects					1,608
Gastropoda - Gyraulus spp.					1,378
Decapoda - Palaemonetes spp.	351				
Insect eggs?					
Coleoptera					
Formicidae					
Hydracarina					
Unidentified Animal					
Total Animal	468	2,259			2,986
Total Food	38,954	173,787	2,323	268,225	114,994

Table . Estimated Average Pounds, (dry-weight) of Food Annually Consumed by Dabbling Ducks on Back Bay, Virginia, and Currituck Sound, North Carolina, During the Period 1958-61; Based on Data from Food Habit Studies Weighted by Waterfowl: Days Utilization.

Species	G.W. Teal	Shoveler	Wood Duck	Total Dabbling	Percent Volume
<i>Najas guadalupensis</i>	64			185,991	30.40
<i>Ruppia maritima</i>	13	74		47,761	7.81
<i>Scirpus,olneyi</i>	1,932	42	3	45,171	7.38
<i>Potamogeton perfoliatus</i>				44,902	7.34
<i>Potamogeton pectinatus</i>	128	4		29,245	4.78
<i>Zea mays</i>	166		135	25,754	4.21
<i>Polygonum punctatum</i>	13			24,748	4.05
<i>Scirpus americanus</i>	3,263	18		16,780	2.74
<i>Eleocharis quadrangulata</i>	77			14,596	2.39
<b>Chara spp.</b>	64			14,044	2.30
<i>Sorghum vulgare</i>				13,903	2.27
<i>Cladium jamaicense</i>	102			11,703	1.91
<i>Potamogeton berchtoldi</i>	51			10,701	1.75
<b>Nitella</b>		33		10,246	1.67
<i>Vallisneria americana</i>				8,635	1.41
<i>Carex spp.</i>	2,636			8,004	1.31
<i>Myrica cerifera</i>				7,428	1.21
<i>Amaranthus viridis</i>				6,548	1.07
<i>Distichlis spicata</i>				5,617	0.92
<i>Polygonum densiflorum</i>				5,387	0.88
<b>Scirpus robustus</b>	13	81		3,555	0.58
<i>Polygonum setaceum</i>				3,476	0.57
<i>Polygonum amphibium</i>				2,999	0.49
<b>Scirpus validus</b>	614	8		2,697	0.44
<i>Polygonum hydropiper</i>		7		2,614	0.43
<i>Cyperus esculentus</i>				2,607	0.43
<i>Eleocharis parvula</i>	13			2,488	0.41
<b>Polygonum arifolium</b>				2,424	0.40
<i>Nyssa aquatica</i>				2,263	0.37
<i>Myrica pensylvanica</i>		2		2,227	0.36
<i>Proserpinaca palustris</i>				1,915	0.31
<i>Sparganium americanum</i>				1,894	0.31
<b>Eleocharis olivacea</b>	115			1,838	0.30
<i>Polygonum sagittatum</i>				1,771	0.29
<i>Paspalum distichum</i>	409	2		1,714	0.28
<i>Cyperus spp.</i>	1,357			1,357	0.22
<i>Cyperus odoratus</i>				1,148	0.19
<i>Polygonum hydropiperoides</i>	614		2	964	0.16
Algae	141	20		954	0.16
<i>Eleocharis palustris</i>	205			748	0.12
<i>Aneilema keisak</i>				584	0.10
<i>Digitaria ischaemum</i>	269			542	0.09
<i>Echinochloa crusgalli</i>				506	0.008

Table cont. Estimated Average Pounds (dry-weight) of Food Annually Consumed by Dabbling Ducks on Back Bay, Virginia, and Currituck Sound, North Carolina, During the Period 1958-61; Based on Data from Food Habit Studies Weighted by Waterfowl Days Utilization.

Species	G.W. Teal	Shoveler	Wood Duck	Total Dabbling	Percent Volume
Panicum dichotomiflorum				506	0.08
Paspalum laeve				428	0.07
Ceratophyllum demersum		1		351	0.06
Ilex opaca				273	0.04
Carpinus caroliniana				269	0.04
<b>Decodon verticillatus</b>	269			269	0.04
Polygonum pensylvanicum	26			201	0.03
Glycine max				174	0.03
Ilex spp.				156	0.03
Solanum carolinense				117	0.02
Leptochloa fascicularis	102			102	0.02
<b>Cornus spp.</b>				78	0.01
Panicum ramosom				78	0.01
Bacopa monnieri				42	0.01
Quercus spp.			26	26	0.00
Nyssa sylvatica var. biflora			18	18	0.00
Fimbristylis <b>castanea</b>	13			13	0.00
Sacciolepis striata		3		3	-
Carex comosa			1	1	-
Unidentified vegetation	<u>51</u>	50		<u>22,267</u>	<u>3.64</u>
Total Vegetation	12,720	346	185	605,821	99.02
Amphipoda				2,376	0.39
Unidentified insects				1,608	0.26
Gastropoda - Gyraulus spp.				1,378	0.23
Decapoda - Palaemonetes spp.				351	0.06
Insect eggs?	64			64	0.01
Coleoptera	13			13	0.00
Formicidae	13			13	0.00
Hydracarina		3		3	-
Unidentified animal		<u>173</u>		<u>173</u>	<u>0.03</u>
Total Animal	90	176		5,979	0.98
Total Food	12,810	522	185	611,800	100.00

Table Estimated Average Pounds (dry-weight) of Food Annually Consumed by Diving Ducks on Back Bay, Virginia, and Currituck Sound, North Carolina, During the Period 1958-61; Based on Data from Food Habit Studies Weighted by Waterfowl Days Utilization.

Species	Greater &					Total Diver	% Volume			
	Redhead	Carvasback	Ringneck	Lesser Scaup*	American Goldeneye			Ruddy	Buffle-head	Old Squaw
Potamogeton pectinatus	12,335	59,169	12,961	3,553	3	20,006	7	2	108,036	23.32
Ruppia maritima	5,461	6,212	20,252	839		28,879	68		61,711	13.32
Najas guadalupensis	22,817	1,087	21,062	3,238		1,256	66	4	49,530	10.69
Vallisneria americana		32,613	15,229	380		1,088			49,310	10.64
Potamogeton perfoliatus		9,628	11,665	144		10,129	1	2	31,569	6.81
Zea mays**			31,430						31,430	6.78
Scirpus americanus		7,765	324	577		753	18		9,437	2.04
Scirpus fluviatilis			9,073						9,073	1.96
Chara spp.	2,974			157		5,776			8,907	1.92
Triticum aestivum**			7,291						7,291	1.57
Zostera marina			5,994						5,994	1.29
Cladium jamaicense			3,564	197		167			3,761	0.81
Myrica cerifera			2,592	183		1,256			2,942	0.64
Scirpus olneyi			648	406		2,093	3		2,313	0.50
Nymphaea odorata						84	5		2,093	0.45
Myrica pensylvanica			324	852			3		1,265	0.27
Polygonum punctatum			810						813	0.18
Rhus copallina			810						810	0.17
Potamogeton pusillus									670	0.14
Berchemia scandens			648			670			648	0.14
Distichlis spicata			648						648	0.14
Eleocharis parvula									648	0.14
Potamogeton berchtoldi			486						590	0.13
Eleocharis quadrangulata									486	0.10
Polygonum densiflorum									419	0.09
Sparganium americanum			324			335		1	335	0.07
Carpinus caroliniana			324						325	0.07
Phytolacca americana			324						324	0.07
Ceratophyllum demersum			162						324	0.07
Polygonum sagittatum			162						162	0.03
									162	0.03

\* Scaup combined on aerial inventories.

\*\* Bait.

Table cont. Estimated Average Pounds (dry-weight) of **Food** Annually Consumed by Diving Ducks on Back Bay, Virginia, and Currituck Sound, North Carolina, During the Period 1958-61; Based on Data from Food Habit Studies Weighted by Waterfowl Days Utilization.

Species	Redhead	Canvasback	Ringneck	Greater & Lesser Scaup*	American Goldeneye	Ruddy	Buffle- head	Old Squaw	Total Diver	% Volume
Scirpus <b>validus</b>			162						162	0.03
Smilax spp.			162						162	<b>0.03</b>
Sorghum vulgare			162						162	0.03
Potamogeton gramineus			162						162	0.03
Scirpus <b>robustus</b>			162						162	0.03
Hippuris vulgaris			162						162	<b>0.03</b>
Polygonum setaceum				79					79	0.02
Ilex vomitoria				13					13	--
Polygonum hydropiperoides							9		9	--
Polygonum arifolium							1		1	--
Unidentified vegetation	<u>5,119</u>	<u>18,170</u>	<u>12,475</u>	<u>1,875</u>	<u>47</u>	<u>2,762</u>			<u>40,448</u>	<u>8.73</u>
Total vegetation	48,706	134,644	160,554	13,083	50	75,673	182	8	432,900	93.45
Amphipoda		5,125	486			7,869			13,480	2.91
Gastropoda - Gyraulus			162			84		31	277	0.06
Hydracarina			243				4		247	0.05
Pelecypoda			162				6		168	0.04
Odonata						84			84	<b>0.02</b>
Hymenoptera			81						81	0.02
Hemiptera - Belestome spp	49								49	0.01
Isopoda				26					26	0.01
Unidentified Animal	<u>---</u>	<u>15,530</u>	<u>324</u>	<u>---</u>	<u>---</u>	<u>---</u>	92		<u>15,946</u>	<u>3.44</u>
Total Animal	49	20,655	1,458	26		8,037	102	31	30,358	6.55
Total <b>Food</b>	48,755	155,299	162,012	13,109	50	83,710	284	39	463,258	100.00

\* Lesser and greater scaup not separated on inventories.

\*\* Probably occurs as bait for diving ducks.

Table . **Comparison** of Percent 'of **Food from** Each Source for Each Waterfowl Species. Based on Food Habit Study Average 1958-61 and Food Habit Study of 1962 on Back Bay, Virginia and Currituck Sound, North Carolina.

Species	Field		Marsh		Bay	
	1958	1962	1958	1962	1958	1962
Mallard	9.6	3.4	70.1	<b>37.8</b>	20.3	51.5
Black Duck	19.8	<b>2.4</b>	59.5	<b>10.8</b>	20.7	96.0
<b>Gadwall</b>			<b>4.0</b>	<b>10.0</b>		
Baldpate		0.1	<b>3.7</b>	<b>45.1</b>	<b>*96.3</b>	80.8
<b>Pintail</b>		1.9	<b>42.4</b>	<b>65.3</b>	57.6	4.3
G. W. Teal	1.3	1.9	94.4			32.8
Wood Duck			<b>3.3</b>	<b>5.2</b>		53.0
Shoveler	96.7	94.8	<b>40.7</b>	<b>54.9</b>	59.3	45.1
<hr/>						
Total Dabblers	6.3	1.6	33.0	33.5	60.7	64.9
<hr/>						
Redhead					100.0	100.0
Canvasback		2.0	5.0		95.0	98.0
<b>Ringneck</b>	1.0	0.3	<b>12.2</b>	<b>3.0</b>	<b>*86.8</b>	<b>*96.7</b>
Gr. & Lr. Scaup		0.1	17.3	2.3	82.9	<b>*97.7</b>
American Goldeneye				10.0	100.0	90.0
Ruddy Duck			3.6	<b>0.9</b>	96.4	99.1
Bufflehead			<b>14.7</b>	<b>3.1</b>	85.3	96.9
<hr/>						
Total Divers	0.3	1.3	7.2	0.6	92.5	98.1
<hr/>						
Total Ducks	3.7	1.5	21.9	20.5	74.4	78.0
<hr/>						
<b>Coot</b>			0.2	0.1	99.8	99.9
Canada Geese	70.0	32.4	5.7	10.3	<b>24.3</b>	<b>57.3</b>
<b>Whistling Swan</b>				1.8	<b>100.0</b>	<b>98.2</b>
Snow Geese			100.0	100.0		
<hr/>						
Total Waterfowl	29.4	13.7	26.2	27.9	44.4	58.4

\* Including bait.

Note: Mergansers and minor species not included.

Table . Pounds (dry-weight) of Food from Each Source Required by Each Species of Waterfowl for 1962 on Back Bay, Virginia and Currituck Sound, North Carolina.

Species	Field	Marsh	'Bay
<b>Mallard</b>	2,379	31,486	35,965
Black Duck	8,062	126,971	200,534
<b>Gadwall</b>		491	4,046
Baldpate.	426	<b>81,330</b>	<b>344,475</b>
<b>Pintail</b>	<b>5,205</b>	123,553	<b>144,923</b>
G. W. Teal	500	17,192	<b>8,649</b>
Wood Duck		<b>74</b>	
Shoveler	1,342	<b>954</b>	783
<hr/>			
Total Dabblers	17,914	382,051	739,375
Redhead			<b>110,124</b>
Canvasback	9,340	Trace	457,646
<b>Ringneck</b>	372	3,720	<b>*119,445</b>
Gr. & Lr. Scaup	10	223	<b>*9,467</b>
American Goldeneye		2	<b>14</b>
<b>Bufflehead</b>	Trace	<b>13</b>	<b>411</b>
Ruddy Duck	'Trace	<b>307</b>	33,744
<hr/>			
Total Divers	9,722	4,265	730,851
Total Ducks	27,636	386,316	1,470,227
.....	Trace	122	122,303
Canada Geese	<b>2,185,963</b>	697,069	<b>3,864,351</b>
Whistling Swan		73,032	<b>3,984,278</b>
Snow Geese		<b>3,358,418</b>	
<hr/>			
<b>Total Waterfowl</b>	<b>2,213,599</b>	<b>4,514,957</b>	<b>9,441,158</b>
<b>**Total Game Species</b>	<b>2,204,259</b>	<b>1,083,507</b>	<b>4,889,110</b>

\* Including bait.

\*\* Redhead, Canvasback, Whistling Swan, and Snow Geese not included as game species. Blue-wing Teal and minor species not included.

Table . Volume Percent Averages from Gizzard Contents of All Species of Waterfowl Occurring in the 1962-63 Food Habit Study. Back Bay, Virginia and Currituck Sound, North Carolina.

Species	Avg.Veg. (%)	Avg.Animal (%)	Avg.Food (%)	Avg.Grit (%)	Number Gizzards
		9.4			
Black Duck	47.0	6.1	56.5	43.5	103
Mallard	52.9	0.0	58.9	41.1	76
Gadwall	50.7	4.9	80.7	19.3	10
Pintail	59.4		64.3	35.7	125
G. W. Teal	54.0	0.9	54.9	44.7	127
Baldpate	53.7	1.6	55.3	48.4	109
Shoveler	51.6	Trace	51.6		3
Wood Duck	61.5	0.0	61.5	38.5	3
			Total	Dabblers :	556
Redhead.	54.4	Trace	54.4	45.6	8
Canvasback	56.4	0.0	56.4	43.6	5
Ringneck	39.3	7.1	46.3	53.7	179
Gr. & Lr. Scaup	38.4	0.0	54.8	45.2	73
American Goldeneye	10.0	39.2	10.0	90.0	1
Fufflehead	34.4	58.8	73.6	26.4	26
American Scoter	41.2	0.0	100.0	0.0	1
Ruddy Duck	41.2	5.4	46.6	53.4	104
			Total	Divers :	397
			Total	Ducks :	953
				31.0	
coot	68.5	0.5	69.0	46.2	117
Canada Geese	53.8	Trace	53.8	40.0	109
American Erant	40.0	0.0	40.0	60.0	1
Whistling Swan	44.8	Trace	44.8	55.2	21
			Total Waterfowl :		1201

Note : Mergansers not included.

Table . Volume Averages from Gizzard Contents of All Species of Waterfowl Occurring in-the 1962-63 Food Habit Study, Back Bay, Virginia and Currituck Sound, North Carolina.

Species	Avg.Veg. (cc)	Avg. Animal (cc)	Avg. Food (cc)	Avg.Grit (cc)	Avg.Ttl. (cc)	Number Gizzards
					5.72	
Black Duck	2.69	0.54	3.23	2.49	6.26	103
Mallard	3.31	0.38	3.69	2.57	5.25	76
Gadwall	4.53	0.00	4.53	1.08	5.61	10
Pintail	2.76	0.23	2.99	1.66	4.65	125
G. W. Teal	0.61	0.01	0.62	0.51	1.13	127
Faldpate	2.61	0.08	2.69	2.17	4.86	109
Shoveler	3.27	Trace				3
Wood Duck	1.95	0.00	1.95	1.07	3.02	3
Total Dabblers:						556
Redhead	5.03	Trace	5.03	4.22	9.25	8
Canvasback	4.91	0.00	4.91	3.79	8.70	5
Ringneck	1.72	0.31	2.03	2.35	4.38	179
Gr. & Lr. Scaup	1.75	0.75	2.50	2.06	4.56	73
American Goldeneye	0.30	0.00	0.30	2.70	3.00	1
Eufflehead	0.73	0.83	1.56	0.56	2.12	26
American Scoter	0.21	0.30	0.51	0.00	0.51	1
Ruddy Duck	1.14	0.15	1.29	1.48	2.77	104
Total Divers:						397
Total Ducks:						953
coot	5.86	0.04	5.90	2.65	8.55	117
Canada Geese	10.01	Trace	10.01	8.60	18.61	109
American Brant	4.60	0.00	4.60	6.90	11.50	1
Whistling Swan	8.48	Trace	8.48	10.44	18.92	21
Total Waterfowl:						1201

Note: Mergansers not included.

Table . Comparison of Percent Total Food (dry-weight) Consumed by All Species of Waterfowl on Back Bay, Virginia and Currituck Sound, North Carolina from 1958 through 1962.

Species	<u>1958-59</u> % Total	<u>1959-60</u> % Total	<u>1960-61</u> % Total	<u>1961-62</u> % Total	<u>Average</u> 1958-61	<u>1962-63</u> % Total
Mallard	0.26	0.30	0.41	0.31	0.33	0.43
Black Duck	1.53	1.49	1.36	1.65	1.49	2.07
Gadwall	0.02	0.02	0.02	0.02	0.02	0.03
Baldpate	2.97	2.17	1.92	2.56	2.31	2.63
Pintail	1.05	0.90	0.84	1.23	0.99	1.69
G. W. Teal	0.04	0.11	0.10	0.17	0.11	0.16
E. W. Teal	0.08	0.03	0.04	0.07	0.05	0.02
Wood Duck	-					0.01
Shoveler	-	0.01		0.01	-	0.01
<b>Total Dabbling</b>	<b>5.96</b>	<b>5.03</b>	<b>4.49</b>	<b>6.02</b>	<b>5.32</b>	<b>7.06</b>
Redhead	0.54	0.19	0.55	0.40	0.42	0.68
Canvasback	1.17	0.59	1.66	1.74	1.34	2.88
Ringneck Duck	0.69	1.13	1.43	2.03	1.39	0.77
Gr. & Lr. Scaup	0.35	0.09	-	0.13	0.11	0.06
Ruddy Duck	0.10	0.38	0.76	1.38	0.72	0.21
Eufflehead						
American Goldeneye	-					
<b>Total Diver</b>	<b>2.85</b>	<b>2.39</b>	<b>4.40</b>	<b>5.69</b>	<b>3.98</b>	<b>4.60</b>
<b>Total Ducks</b>	<b>8.83</b>	<b>7.52</b>	<b>9.09</b>	<b>11.71</b>	<b>9.33</b>	<b>11.67</b>
<b>Coot</b>	<b>4.51</b>	<b>38.20</b>	<b>4.60</b>	<b>4.31</b>	<b>4.10</b>	<b>0.76</b>
Canada Geese	36.37	28.46	46.19	41.59	41.46	41.78
Whistling Swan	21.60	22.44	22.61	20.02	23.25	25.05
Snow Geese	28.25	22.86	17.51	22.37	21.79	20.74
American Brant	0.44	-			0.07	

\*Total Waterfowl ( All. instances 100.00 percent. )

\* Minor species such as Cld Squaw included in total but not listed above.

Table . Gizzard Contents of 52 Mallards from Back Bay, Virginia, and Currituck Sound, North Carolina; 1958-61.

Species	Volume (cc)	% Volume Food	Times
Polygonum punctatum	18.58	11.3	17
Scirpus olneyi	16.54	10.0	20
Potamogeton pectinatus	13.23	8.0	19
Polygonum amphibium	12.61	7.7	1
Najas guadalupensis	10.62	6.4	10
Zea mays	8.10	4.9	3
Cladium jamaicense	7.71	4.7	9
Polygonum sagittatum	6.69	4.1	6
Polygonum arifolium	5.11	3.1	5
Scirpus robustus	5.04	3.1	12
Myrica cerifera	3.53	2.1	13
Ruppia maritima	3.28	2.0	10
Eleocharis quadrangulata	3.12	1.9	11
Potamogeton perfoliatus	2.42	1.5	12
Aneilema keisak	2.40	1.5	1
Echinochloa crusgalli	2.20	1.3	1
Panicum dichotomiflorum	2.20	1.3	1
Carex spp.	1.83	1.1	2
Scirpus validus	1.79	1.1	8
Paspalum laeve	1.77	1.1	3
Proserpinaca palustris	1.55	0.9	7
Ceratophyllum demersum	1.50	0.9	1
Nyssa aquatica	1.40	0.9	1
Chara spp.	1.20	0.7	1
Ilex opaca	1.16	0.7	2
Digitaria ischaemum	1.10	0.7	1
Scirpus americanus	0.79	0.5	10
Eleocharis palustris (type)	0.76	0.5	9
Sparganium americanum	0.71	0.4	3
Ilex spp.	0.60	0.4	2
Solanum carolinense	0.55	0.3	1
Potamogeton berchtoldi	0.53	0.3	2
Panicum ramosum	0.40	0.2	1
Cornus spp.	0.32	0.2	1
Myrica pensylvanica	0.18	0.1	4
Rhus radicans	0.04		1
Carpinus caroliniana	0.03		2
Carex comosa	Trace		1
Echinochloa walteri	Trace		1
Eleocharis parvula	Trace		1

Table cont. Gizzard Contents of 52 Mallards from Back Bay, Virginia,  
and Currituck Sound, North Carolina; 1958-61.

Species	Volume (cc)	% Volume Food	Times
Juniperus virginiana	Trace		1
Leersia oryzoides	Trace		1
Nymphaea odorata	Trace		1
Polygonum hydropiperoides	Trace		1
Rosa palustris	Trace		1
Rumex spp.	Trace		1
Sacciolepis striata	Trace		1
<b>Setaria magna</b>	Trace		1
Trifolium spp.	Trace		1
Unidentified vegetation	<u>21.17</u>	<u>12.9</u>	<u>14</u>
Total Vegetation	162.76	98.8	51
<u>Decapoda</u>			
Palaemonetes sp.	1.40	0.9	3
<u>Amphipoda</u>			
Gammarus	0.53	0.3	3
Nematoda	Trace		1
<b>Insecta</b>	Trace		1
Odonata	Trace		1
Unidentified animal	<u>Trace</u>		<u>2</u>
Total Animal	1.93	1.2	10
Galls	0.12	-	1
Grit	120.81	(42.3)*	52
Lead shot (number)	7		6
Total Food	164.69	(57.7)*	51
Total Content	285.50		

\* Percent of total content.

Table . Gizzard Contents of 52 Black Ducks from Back Bay, Virginia,  
and Currituck Sound, North Carolina; 1958-61.

Species	Volume (cc)	% Volume Food	Times
<i>Scirpus olneyi</i>	24.68	13.2	18
<i>Polygonum punctatum</i>	21.96	11.7	16
<i>Zea mays</i>	19.37	10.3	4
<i>Sorghum vulgare</i>	14.95	8.0	3
<i>Najas guadalupensis</i>	13.70	7.3	7
<i>Eleocharis quadrangulata</i>	13.43	7.2	8
<i>Potamogeton perfoliatus</i>	10.38	5.5	8
<i>Potamogeton pectinatus</i>	7.65	4.1	9
<i>Cladium jamaicense</i>	6.88	3.7	11
<i>Distichlis spicata</i>	5.85	3.1	1
<i>Polygonum densiflorum</i>	5.85	3.1	4
<i>Polygonum setaceum</i>	3.75	2.0	4
<i>Vallisneria americana</i>	2.80	1.5	1
<i>Cyperus esculentus</i>	2.80	1.5	1
<i>Polygonum hydropiper</i>	2.74	1.5	4
<i>Myrica cerifera</i>	2.62	1.4	19
<i>Nyssa aquatica</i>	2.10	1.1	1
<i>Scirpus americanus</i>	1.83	1.0	10
<i>Sparganium americanum</i>	1.80	1.0	3
<i>Proserpinaca palustris</i>	1.69	0.9	11
<i>Scirpus robustus</i>	1.62	0.9	8
<i>Ruppia maritima</i>	1.37	0.7	6
<i>Polygonum arifolium</i>	1.31	0.7	4
<i>Scirpus validus</i>	0.58	0.3	5
Algae	0.50	0.3	2
<i>Eleocharis palustris</i> (type)	0.41	0.2	4
<i>Myrica pensylvanica</i>	0.34	0.2	6
<i>Polygonum hydropiperoides</i>	0.32	0.2	7
<i>Polygonum pensylvanicum</i>	0.18	0.1	2
<i>Glycine max</i>	0.18	0.1	1
<i>Polygonum sagittatum</i>	0.12	0.1	1
<i>Nyssa sylvatica</i> var. <i>biflora</i>	0.08		1
<i>Decodon verticillatus</i>	0.04		1
<i>Ceratophyllum demersum</i>	Trace		1
<i>Chara</i> spp.	Trace		1
<i>Cyperus</i> spp.	Trace	-	1
<i>Echinochloa walteri</i>	Trace	-	1
<i>Pimbristylis castanea</i>	Trace	-	2
<i>Hibiscus oculiroseus</i>	Trace	-	1
<i>Kosteletzka virginica</i>	Trace	-	1
<i>Nymphaea odorata</i>	Trace	-	1

**Table** cont. Gizzard Contents of 52 Black Ducks from Back Bay, Virginia, and Currituck Sound, North Carolina; 1958-61.

Species	Volume (cc)	% Volume Food	Times
Panicum dichotomiflorum	Trace	-	1
Paspalum spp.	Trace	-	1
Polygonum amphibium	Trace	-	1
Potamogeton berchtoldi?	Trace	-	1
Potamogeton gramineus?	Trace	-	2
Rhus copallina	Trace	-	1
Sagittaria falcata	Trace	-	1
Zostera marina	Trace	-	1
Unidentified vegetation	<u>10.84</u>	<u>5.8</u>	12
Total Vegetation	184.72	98.7	
<u>Amphipoda</u>			
Gammarus	2.73	1.3	6
Diptera	Trace		1
Odonata	Trace		1
Unidentified animal	<u>Trace</u>	-	2
Total Animal	2.73	1.3	7
Grit	92.89	(33.1)*	52
Lead Shot (number)	24		13
Total Food	187.45		
Total Content	280.34	(66.9)*	

\* Percent of total content.

Table . Gizzard Contents of 142 Baldpate from Back Bay, Virginia, and Currituck Sound, North Carolina, 1958-61,

Species	(cc) Volume	% Volume Food	Times
<i>Najas guadalupensis</i>	176.31	52.4	110
<i>Ruppia maritima</i>	50.56	15.0	39
<i>Potamogeton perfoliatus</i>	31.32	9.3	21
<b>Chara</b> spp.	17.00	5.1	13
<i>Potamogeton pectinatus</i>	15.13	4.5	13
<b>Nitella</b> spp.	12.79	3.8	19
<i>Vallisneria americana</i>	7.52	2.2	13
<i>Zea mays</i>	7.20	2.1	1
<i>Cladium jamaicense</i>	4.16	1.2	4
<i>Scirpus olneyi</i>	3.27	1.0	19
<b>Scirpus validus</b>	1.42	0.4	11
<i>Myrica cerifera</i>	1.20	0.4	2
<i>Eleocharis quadrangulata</i>	1.00	0.3	1
<i>Potamogeton berchtoldi</i>	0.79	0.2	2
<i>Scirpus americanus</i>	0.61	0.2	3
<i>Paspalum distichum</i>	0.25	0.1	1
<b>Carpinus caroliniana</b>	0.20	0.1	1
<i>Glycine max</i>	0.16		1
<i>Eleocharis parvula</i>	0.14		5
<b>Pinus taeda</b>	0.06		1
<b>Polygonum densiflorum</b>	0.06		1
<i>Cyperus</i> spp.	0.04		4
<b>Cornus</b> spp.	0.04		1
Algae	Trace		1
<i>Garex</i> spp.	Trace		1
<i>Cephalanthus occidentalis</i>	Trace		1
<i>Cyperus odoratus</i>	Trace		1
<i>Eleocharis palustris</i> (type)	Trace		3
<i>Liquidambar styraciflua</i>	Trace		1
<i>Myrica pensylvanica</i>	Trace		1
<i>Paspalum boscianum</i>	Trace		1
<i>Polygonum hydropiper</i>	Trace		1
<b>Polygonum punctatum</b>	Trace		1
Unidentified vegetation	5.05	1.5	1
Total Vegetation	336.28	99.8	141
<i>Cordylophora lacustris</i>	Trace		1
Unidentified insect	Trace		1
Total Animal	Trace		2
Grit	320.02	(48.8)*	142
Lead shot (number)	1		1
Total Food	336.28	(51.2)*	141
Total Content	656.30	(51.2)*	

\* Percent of total content.

Table . Gizzard Contents of 50 Pintail from Back Bay, Virginia, and Currituck Sound, North Carolina; 1958-61.

Species	(cc) Volume	% Volume Food	Times
<i>Najas guadalupensis</i>	24.71	24.7	18
<i>Scirpus olneyi</i>	<b>11.88</b>	<b>11.9</b>	11
<i>Scirpus americanus</i>	9.58	9.6	19
<i>Potamogeton berchtoldi</i>	8.70	8.7	3
<i>Potamogeton perfoliatus</i>	8.47	8.5	12
<i>Potamogeton pectinatus</i>	5.86	5.9	13
<i>Amaranthus viridis</i>	5.70	5. a	1
<i>Ruppia maritima</i>	4.55	<b>4.6</b>	14
<i>Carex</i> spp.	4.28	4.3	2
<i>Myrica cerifera</i>	2.70	2.7	11
<i>Eleocharis parvula</i>	1.99	2.0	3
<i>Myrica pensylvanica</i>	1.55	1.6	4
<i>Eleocharis olivacea</i>	<b>1.50</b>	<b>1.5</b>	1
<i>Cyperus odoratus</i>	1.00	1.0	2
<i>Paspalum distichum</i>	0.90	<b>0.9</b>	1
<i>Scirpus robustus</i>	0.58	0.6	4
<i>Eleocharis quadrangulata</i>	0.43	<b>0.4</b>	3
<i>Distichlis spicata</i>	0.22	<b>0.2</b>	1
<i>Vallisneria americana</i>	<b>0.10</b>	<b>0.1</b>	2
<i>Cladium jamaicense</i>	<b>0.07</b>	<b>0.1</b>	4
<i>Leptochloa fascicularis</i>	Trace	0	1
<i>Nitella</i> spp.	Trace		1
<i>Polygonum hydropiperoides</i>	Trace		1
<i>Polygonum punctatum</i>	Trace		1
<i>Polygonum setaceum</i>	Trace		1
<i>Rhus copallina</i>	Trace		1
<i>Scirpus validus</i>	Trace		3
Unidentified vegetation	<b>2.50</b>	<b>2.5</b>	<b>3</b>
Total Vegetation	97.27	<b>97.5</b>	<b>49</b>
<b>Insecta</b>	1.35	1.4	1
Gastropoda	1.20	1.2	6
<b>Amphipoda</b>	<u>Trace</u>		<u>1</u>
Total Animal.	2.55	2.6	8
Grit	104.18	(51.1)*	50
Lead Shot (number)	3		2
Total Food	99.82	(48.9)*	49
Total Content	204.00		

\* Percent of total content.,

Table . Gizzard Contents of 42 Green-winged Teal from Back Bay, Virginia, and Currituck Sound, North Carolina, 1958-61.

Species	(cc) Volume	% Volume Food	Times
Scirpus americanus	10.18	25.5	16
Carex spp.	8.22	20.6	15
Scirpus olneyi	6.04	15.1	13
Cyperus spp.	4.23	10.6	7
Polygonum hydropiperoides	1.91	4.8	7
Scirpus validus	1.90	4.8	8
Paspalum distichum	1.29	3.2	3
Decodon verticillatus	0.85	2.1	2
Digitaria ischaemum	0.83	2.1	1
Eleocharis palustris (type)	0.63	1.6	12
Zea mays	0.53	1.3	1
Algae	0.44	1.1	2
Potamogeton peetinatus	0.40	1.0	4
Eleocharis olivacea	0.37	0.9	1
Leptochloa fascicularis	0.32	0.8	4
Cladium jamaicense	0.31	0.8	4
Eleocharis quadrangulata	0.24	0.6	5
Chara spp.	0.21	0.5	2
Najas guadalupensis	0.18	0.5	3
Potamogeton berehtoldi	0.16	0.4	3
Polygonum pennsylvanicum	0.06	0.2	2
Scirpus robustus	0.05	0.1	4
Fimbristylis castanea	0.04	0.1	1
Eleocharis parvula	0.03	0.1	3
Polygonum punctatum	0.03	0.1	2
Ruppia maritima	0.03	0.1	4
Polygonum hydropiper	0.02	-	1
Nitella spp.	0.01	-	1
Setaria viridis	0.01	-	1
Bidens spp.	Trace	-	1
Carex eomosa	Trace	-	1
Myrica cerifera	Trace	-	1
Panicum dichotomiflorum	Trace	-	1
Polygonum densiflorum	Trace	-	1
Potamogeton perfoliatus	Trace	-	1
Proserpinaca palustris	Trace	-	1
Unidentified vegetation	0.16	0.4	11
Total Vegetation	39.68	99.4	42

Table **cont.** Gizzard Contents of 42 Green-winged Teal from Back Bay, Virginia, and Currituck Sound, North Carolina, 1958-61.

Species	(cc) Volume	% Volume Food	Times
Unidentified insect eggs?	0.20	0.5	1
Coleoptera _____?	0.03	0.1	2
Formicidae	0.02	0.5	1
Diptera (Stratiomyiidae)	Trace		3
Isopoda (Cyanthura polita)	Trace		1
Coleoptera			
Bydrophilidae ( <b>Berosus</b> )	Trace		1
Dytiscidae (Hydroporus)	Trace		1
Unidentified animal	<u>0.01</u>		2
Total Animal	0.26	0.7	9
Amidostomum	Trace		1
Grit	22.06	(35.6)*	42
Lead Shot			0
Total Food	39.94	(64.4)*	42
Total Content	62.0		

\* Percent of total content.

Table , Gizzard Content of 17 **Gadwall** from Back Bay, Virginia, and Currituck Sound, North Carolina, **1960-61.**

Species	(cc) Volume	% Volume Food	Times
<b>Najas</b> guadalupensis	<b>39.26</b>	<b>66.4</b>	<b>13</b>
Algae (Cyanophyta - oscillatoriales)	<b>6.95</b>	11.7	<b>2</b>
Eleocharis parvula	<b>4.50</b>	7.6	<b>1</b>
Ruppia maritima	<b>2.08</b>	<b>3.5</b>	<b>3</b>
Scirpus <b>validus</b>	<b>1.32</b>	<b>2.2</b>	<b>6</b>
Bacopa <b>monnieri</b>	<b>1.05</b>	<b>1.8</b>	<b>1</b>
Cyperus esculentus	Trace		<b>1</b>
Panicum <b>capillare</b>	Trace	-	<b>1</b>
Potamogeton pectinatus	Trace		<b>1</b>
Unidentified vegetation	<u><b>4.00</b></u>	<u><b>6.8</b></u>	<b>2</b>
Total Vegetation	<b>59.16</b>	100.0	<b>16</b>
Lepidoptera	<u>Trace</u>	<u>-</u>	<u><b>1</b></u>
Total Animal	Trace		<b>1</b>
Grit	<b>31.34</b>	<b>(34.6)*</b>	<b>17</b>
Lead Shot (number)	1		<b>1</b>
Total Food	59.16	<b>(65.4)*</b>	<b>16</b>
Total Content	90.50		<b>17</b>

\* Percent of total content.

Table , Gizzard Contents of 4 Wood Duck from Back Bay, Virginia; 1958-61.

Species	(cc) Volume	% Volume Food	Times
Zea mays	10.63	73.1	2
Quercus spp.	2.00	13.8	1
Nyssa spp.	1.43	9.8	2
Scirpus olneyi	0.25	1.7	1
<b>Polygonum</b> hydropiperoides	0.15	1.0	3
Carex comosa	0.08	0.6	1
Sparganium <b>americanum</b>	<u>Trace</u>	<u>          </u>	<u>1</u>
Total Vegetation	14.54	100.0	4
Grit	2.96	(16.9)*	4
Lead Shot (number)	1		1
Total Food	14.54	(83.1)*	4
Total Content	17.50		4

\* Percent of total content.

Table . Gizzard Contents of 9 Shoveler from Back Bay, Virginia, and Currituck Sound, North Carolina; 1958-61,

Species	(cc) Volume	% Volume Food	Times
Scirpus <b>robustus</b>	1.84	15.5	3
Ruppia maritima	1.70	14.3	2
Scirpus olneyi	0.96	8.1	2
<b>Nitella</b> spp.	0.75	6.3	2
Algae	0.45	<b>3.8</b>	1
Scirpus americanus	0.41	3.4	3
Scirpus <b>validus</b>	0.18	1.5	2
Polygonum hydropiper	0.15	1.3	2
<b>Potamogeton</b> pectinatus	0.09	0.8	2
Sacciolepis striata	<b>0.07</b>	0.6	1
Myrieta pensylvanica	0.04	<b>0.3</b>	1
Paspalum <b>distichum</b>	0.03	<b>0.3</b>	1
Ceratophyllum demersum	0.02	0.2	1
Polygonum pensylvanicum	<b>0.02</b>	0.2	1
Eleocharis palustris (type)	Trace		1
Eleocharis parvula	Trace	-	1
<b>Myrica</b> cerifera	Trace		1
<b>Panicum</b> virgatum	Trace		1
Scirpus fluviatilis	Trace		1
Unidentified vegetation	<u>1.15</u>	<u>9.7</u>	3
Total Vegetation	7.86	66.1	
Hydracarina	0.07	0.6	1
Unidentified animal	<u>3.96</u>	<u>33.3</u>	1
Total Animal	4.03	33.9	2
Grit	13.61	(53.4)*	9
Lead Shot			0
Total Food	11.89	(46.6)*	9
Total Content	25.50		9

\* Percent of total content.

Table . Gizzard Contents of 6 Canvasback from Back Bay, Virginia, and Currituck Sound, North Carolina; 1958-61.

Species	(cc) Volume	% Volume Food	Times
Potamogeton pectinatus	11.44	38.1	4
Vallisneria americana	6.30	21.0	1
Potamogeton perfoliatus	1.87	6.2	3
Scirpus americanus	1.50	5.0	2
Ruppia maritima	1.21	4.0	5
Najas guadalupensis	0.21	0.7	1
Echinochloa walteri	Trace	-	1
Polygonum punctatum	Trace	-	1
Scirpus olneyi	Trace	-	1
Spartina cynosuroides	Trace	-	1
Unidentified vegetation	<u>3.50</u>	<u>11.7</u>	<u>1</u>
Total Vegetation	26.03	86.7	6
Amphipoda	1.00	3.3	1
Unidentified animal	<u>3.00</u>	<u>10.0</u>	<u>1</u>
Total Animal	4.00	13.3	1
Grit	16.97	(36.1)*	6
Lead Shot (number)	1		1
Total Food	30.03	(63.9)*	6
Total Content	47.0		6

\* Percent of total content.

Table . Gizzard Contents of 13 Redhead from Back Bay, Virginia, and Currituck Sound, North Carolina; 1958-61.

Species	(cc) Volume	% Volume Food	Times
Najas guadalupensis	13.43	46.8	8
Potamogeton pectinatus	7.27	25.3	3
Ruppia maritima	3.23	11.2	3
<b>Chara</b> spp.	<b>1.75</b>	6.1	1
Algae	Trace		1
Spartina cynosuroides	Trace		1
Vallisneria americana	Trace		3
Unidentified vegetation	<u>3.00</u>	<u>10.5</u>	<u>1</u>
Total Vegetation	28.68	99.9	12
Hemiptera - Belostomidae-Belostome spp.	<u>0.04</u>	<u>0.1</u>	<u>1</u>
Total Animal	0.04	0.1	1
Grit	38.28	(57.1)*	13
Lead shot			0
Total Food	28.72	(42.9)*	12
Total Content	67.00		13

\* Percent of total content.

Table . Gizzard Contents of 65 **Ringneck** Duck from Back Bay, Virginia, and Currituck Sound, North Carolina; 1958-61.

Species	(cc) Volume	% Volume Food	Times
<i>Zea mays</i> *	27.38	19.4	5
<i>Najas guadalupensis</i>	18.43	13.0	24
<i>Ruppia maritima</i>	17.74	12.5	36
<i>Vallisneria americana</i>	13.33	9.4	4
<i>Potamogeton pectinatus</i>	11.29	8.0	29
<i>Potamogeton perfoliatus</i>	10.21	7.2	28
<i>Scirpus fluviatilis</i>	7.92	5.6	1
<i>Triticum aestivum</i> *	6.30	4.5	1
<i>Zostera marina</i>	5.27	3.7	8
<i>Cladium jamaicense</i>	3.13	2.2	10
<i>Myrica cerifera</i>	2.32	1	5
<i>Polygonum punctatum</i>	0.75	0.5	1
<i>Rhus copallina</i>	0.68	0.5	2
<i>Scirpus olneyi</i>	0.62	0.4	4
<i>Berchemia scandens</i>	0.60	0.4	1
<i>Distichlis spicata</i>	0.52	0.4	1
<i>Potamogeton berchtoldi</i>	0.49	0.3	6
<i>Scirpus americanus</i>	0.34	0.2	9
<i>Sparganium americanum</i>	0.34	0.2	4
<i>Myrica pensylvanica</i>	0.32	0.2	6
<i>Phytolacca americana</i>	0.30	0.2	1
<i>Carpinus caroliniana</i>	0.23	0.2	1
<i>Polygonum sagittatum</i>	0.15	0	1
<i>Sorghum vulgare</i>	0.15	0.1	1
<i>Hippuris vulgaris</i>	0.14	0.1	1
<i>Scirpus validus</i>	0.12	0.1	5
<i>Ceratophyllum demersum</i>	0.09	0.1	1
<i>Smilax</i> spp.	0.08	0.1	1
<i>Scirpus robustus</i>	0.07	0.1	3
<i>Potamogeton gramineus</i>	0.07	0.1	1
Algae	Trace	-	1
<i>Carex comosa</i>	Trace	-	1
<i>Cyperus</i> spp.	Trace	-	1
<i>Echinochloa walteri</i>	Trace	-	1
<i>Eleocharis palustris</i> (type)	Trace	-	3
<i>Eleocharis quadrangulata</i>	Trace	-	1
<i>Fimbristylis castanea</i>	Trace	-	1
<i>Polygonum densiflorum</i>	Trace	-	1
<i>Polygonum hydropiper</i>	Trace	-	3
<i>Polygonum hydropiperoides</i>	Trace	-	2
<i>Potamogeton pusillus</i> (type)	Trace	-	1
<i>Proserpinaca palustris</i>	Trace	-	1
<i>Rubus</i> spp.	Trace	-	1
<i>Spartina cynosuroides</i>	Trace	-	1
Unidentified vegetation	10.86	7.7	10
Total Vegetation	140.24	99.2	62

\* Bait

\*\* Percent of total content.

Table cont. Gizzard Contents of 65 **Ringneck** Duck from Back Bay,  
Virginia, and Currituck Sound, North Carolina; 1958-61.

Species	(cc) Volume	% Volume Food	Times
Amphipoda	0.40	0.3	2
Hydracarina	0.18	0.1	
Gastropoda	0.13	0.1	4
Hymenoptera	0.09	0.1	1
Pelecypoda	0.09	0.1	1
Unidentified animal	<u>0.28</u>	0.2	<u>3</u>
Total Animal	1.17	0.8	5
Grit	147.58	(51.0)**	65
Lead Shot	0.51(22)	(0.2)**	4
Total Food	141.41	(48.8)**	62
Total Content	289.5		65

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\* Bait.

\*\* Percent of total content.

Table , Gizzard Contents of 7 Greater **Scaup** from Back Bay, Virginia,  
and Currituck Sound, North Carolina; 1958-61.

Species	(cc) Volume	% Volume Food	Times
Najas guadalupensis	5.86	50.0	4
Potamogeton pectinatus	3.30	28.2	4
Eleocharis <b>parvula</b>	1.10	9.4	1
Scirpus americanus	0.88	7.5	2
Ruppia maritima	0.51	4.3	4
Vallisneria americana	0.03	0.3	1
Potamogeton perfoliatus	0.03	0.3	2
<b>Chara</b> spp.	Trace		1
Myrica pensylvanica	<u>Trace</u>	<u>        </u>	<u>1</u>
Total Vegetation	11.71	100.0	6
Unidentified insect	Trace		1
Grit	16.79	(58.9)*	6
Total Food	11.71	(41.1)*	6
Total Content	28.50		7

\* Percent of total content.

Table . Gizzard Contents of 17 Lesser Scaup from Back Bay, Virginia, and Currituck Sound, North Carolina; 1958-61,

Species	(cc) Volume	% Volume Food	Times
Potamogeton pectinatus	3.34	26.1	8
Myrica pensylvanica	1.60	12.5	1
Ruppia maritima	1.06	8.3	7
Scirpus olneyi	0.75	5.9	1
Vallisneria americana	0.69	5.4	3
Cladium jamaicense	0.36	2.8	2
Myrica cerifera	0.33	2.6	4
<b>Chara spp.</b>	0.30	2.3	1
Potamogeton perfoliatus	0.24	1.9	5
Scirpus americanus	0.20	1.6	1
Najas guadalupensis	0.19	1.5	4
Polygonum pensylvanicum	0.15	1.2	1
Ilex vomitoria	0.03	0.2	1
Potamogeton berchtoldi	Trace		1
Unidentified vegetation	<u>3.50</u>	<u>27.4</u>	<u>1</u>
Total Vegetation	12.74	99.7	16
Isopoda - (Cyanthura?)	0.04	0.3	2
Amphipoda	Trace		1
Gastropoda	<u>Trace</u>		<u>1</u>
Total Animal	0.04	0.3	2
Grit	24.04	(64.1)*	17
Lead Shot (volume and number)	0.68- (29)	( 1.8)*	1
Total Food	12.78	(34.1)*	16
Total Content	37.50		17

\* Percent of total content.

Table . Gizzard Contents of 55 Ruddy Duck from Back Bay, Virginia, and Currituck Sound, North Carolina; 1958-61,

Species	(cc) Volume	% Volume Food	Times
Ruppia maritima	14.31	34.5	37
Potamogeton pectinatus	9.92	23.9	13
Potamogeton perfoliatus	5.04	12.1	18
Chara spp.	2.85	6.9	1
Nymphaea odorata	1.02	2.5	2
Najas guadalupensis	0.61	1.5	7
Scirpus olneyi	0.61	1.5	2
Vallisneria americana	0.54	1.3	3
Scirpus amerfearus	0.38	0.9	2
Potamogeton pusillus (type)	0.32	0.8	1
Eleocharis quadrangulata	0.21	0.5	3
Polygonum densiflorum	0.15	0.4	1
Myrica eerifera	0.09	0.2	1
Myrica pensylvanica	0.06	0.1	1
Unidentified vegetation	<u>1.38</u>	<u>3.3</u>	<u>8</u>
Total Vegetation	37.49	90.4	55
Amphipoda	3.91	9.4	9
Gastropoda	0.06	0.1	1
Odonata	0.04	0.1	1
Unidentified animal	<u>Trace</u>		<u>1</u>
Total Animal	4.01	9.6	11
Grit	51.50	(55.4)*	55
Lead Shot			0
Total Food	41.50	(44.6)*	55
Total Content	93.00		55

\* Percent of total content,

Table . Gizzard Contents of 12 Bufflehead from Back Bay, Virginia,  
and Currituck Sound, North Carolina; 1958-61.

Species	(cc) Volume	% Volume Food	Times
Ruppia maritima	2.23	23.7	7
Najas guadalupensis	2.17	23.1	6
Scirpus americanus	0.60	6.4	2
Polygonum hydropiperoides	0.30	3.2	1
Potamogeton pectinatus	0.23	2.4	2
Myrica pensylvanica	0.15	1.6	1
Scirpus olneyi	0.11	1.2	2
Polygonum punctatum	0.10	1.1	2
Polygonum arifolium	0.05	0.5	1
Sparganium americanum	0.05	0.5	1
Potamogeton perfoliatus	0.03	0.3	3
Cladium jamaicense	0.01	0.1	1
Galium spp.	Trace	-	1
Myrica cerifera	Trace		1
Polygonum hydropiper	Trace		1
<b>Potamogeton gramineus (type)</b>	<u>Trace</u>		<u>1</u>
Total Vegetation	6.03	64.2	11
Pelecypoda	0.20	2.1	1
Hydracarina	0.13	1.4	1
Gastropoda	Trace		3
Pisces	Trace		2
Unidentified animal	<u>3.03</u>	<u>32.3</u>	2
Total Animal	3.36	35.8	6
Grit	6.21	(39.8)*	12
Lead Shot			0
Total Food	9.39	(60.2)*	11
Total Content	15.60		12

\* Percent of total content.

Table . Gizzard Contents of 2 American Goldeneye from Back Bay, Virginia,  
and Currituck Sound, North Carolina; 1958 and 1961.

Species	(cc) Volume	% Volume Food	Times
Potamogeton pectinatus	0.20	5.6	1
Myrica pensylvanica	Trace		1
Ruppia maritima	Trace		1
Unidentified vegetation	<u>3.40</u>	<u>94.4</u>	<u>1</u>
Total Vegetation	3.60	100.0	1
Unidentified animal	<u>Trace</u>		<u>1</u>
Total Animal	Trace		1
Grit	0.90	(20.0)*	2
Total Food	3.60	(80.0)*	1
Total Content	4.50		2

\* Percent of total content.

Table . Gizzard Content of 1 Old Squaw from Currituck Sound, North Carolina; January 1961,

Species	(cc) Volume	% Volume Food	Times
Najas guadalupensis	0.05	10.0	1
Potamogeton pectinatus	0.02	4.0	1
Potamogeton perfoliatus	0.02	4.0	1
Ruppia maritima	<u>Trace</u>	<u>      </u>	<u>1</u>
Total Vegetation	0.09	18.0	1
Gastropoda - Gyraulus	0.41	82.0	1
Diptera	Trace		1
Unidentified animal	<u>Trace</u>	<u>      </u>	<u>1</u>
Total Animal	0.41	82.0	1
Grit	Trace		1
Lead Shot			0
Total Food	0.50	(100.0)*	1
Total Content	0.50	100%	1

\* Percent of total content.

Table . Gizzard Contents of 6 Mergansers\* from Back Bay, Virginia;  
1958-61.

Species	(cc) Volume	% Volume Food	Times
Algae	0.20	1.3	2
Unidentified vegetation	<u>0.20</u>	1.3	<u>1</u>
Total Vegetation	0.40	2.6	3
Pisces	<u>15.05</u>	<u>97.4</u>	<u>5</u>
Total Animal	15.05	97.4	5
Grit	1.55	(9.0)**	4
Lead Shot			0
Total Food	15.45	(91.0)**	5
Total Content	17.00		6

\* Includes 1 American, 1 Redbreasted, 4 Hooded Mergansers,  
\*\* Percent of total content.

Table . Gizzard Contents of 122 Canada Geese from Back Bay, Virginia, and Currituck Sound, North Carolina; 1958-61.

Species	(cc) Volume	% Volume Food	Times
Zea mays	875.71	57.4	41
Najas guadalupensis	272.11	17.8	45
Panicum amarum	70.30	4.6	4
Digitaria spp.	40.75	2.7	3
Digitaria sanguinalis	39.35	2.6	16
Potamogeton pectinatus	37.85	2.5	22
Glycine max	32.52	2.1	3
Ruppia maritima	28.80	1.9	13
Hordeum vulgare	18.64	1.2	3
Potamogeton perfoliatus	14.75	1.0	6
Trifolium repens	9.20	0.6	1
Sagittaria subulata	9.05	0.6	2
Digitaria ischaemum	6.40	0.4	9
Bacopa monnieri	4.95	0.3	1
Scirpus americanus	3.35	0.2	8
Eleocharis quadrangulata	2.70	0.2	3
Scirpus fluviatilis	1.80	0.1	1
Scirpus olneyi	1.20	0.1	9
Chara spp.	1.08	0.1	3
Vallisneria americana	1.00	0.1	3
Cyperus esculentus	1.00	0.1	1
Scirpus validus	0.95	0.1	2
Digitaria serotina	0.78	0.1	1
Distichlis spicata	0.75		1
Poa spp.	0.72		1
Algae	Trace		1
Amaranthus viridis	Trace		1
Carex spp.	Trace		3
Cladium jamaicense	Trace		1
Eleocharis palustris (type)	Trace		1
Eleusine indica	Trace		5
Myrica pensylvanica	Trace		3
Panicum spp.	Trace		1
Panicum capillare	Trace		1
Panicum dichotomiflorum	Trace		1
Polygonum densiflorum	Trace		1
Polygonum punctatum	Trace		2
Polygonum setaceum	Trace		2
Scirpus robustus	Trace		5
Solanum carolinense	Trace		1
Sparganium americanum	Trace		1
Stellaria spp.	Trace		3
Unidentified vegetation	20.09	1.3	18
Unidentified grasses	28.35	1.9	3
Total Vegetation	1,524.15	100.0	113

Table cont. Gizzard Contents of 122 Canada Geese from Back Bay,  
Virginia, and Currituck Sound, North Carolina; 1958-61.

Species	(cc) Volume	% Volume Food	Times
Orthoptera - Gryllidae	Trace		1
Amphipoda	Trace		1
Unidentified insect	<u>Trace</u>		<u>1</u>
Total Animal	Trace		3
Amidostomum	Trace		6
Grit	1128.85	(42.5)*	122
Lead Shot (number)	5		5
Total Food	1524.15	(57.5)*	113
Total Content	2653.00		122

\* Percent of total content.

Table . Gizzard Contents of 90 American Coot from Back Bay, Virginia, and Currituck Sound, North Carolina; 1958-61.

Species	(cc) Volume	% Volume Food	Times
Najas guadalupensis	538.67	96.8	88
Potamogeton peetinatus	5.22	0.9	4
<b>Nitella</b> spp.	4.20	0.8	2
Vallisneria americana	4.00	0.7	4
<b>Chara</b> spp.	1.70	0.3	2
Myriophyllum spicatum	1.35	0.2	1
Scirpus <b>robustus</b>	0.50	0.1	1
Sparganium americanum	0.50	0.1	1
Potamogeton perfoliatus	0.33	0.1	2
Ruppia maritima	Trace		1
Scirpus <b>validus</b>	<u>Trace</u>	<u>        </u>	<u>1</u>
Total Vegetation	556.47	100.0	90
Diptera	<u>Trace</u>		<u>1</u>
Total Animal	Trace		1
Grit	160.03	(22.3)*	90
Lead Shot			0
Total Food	556.47	(77.7)*	90
Total Content	716.50		90

\* Percent of total content.

Table . Gizzard Content of 1 Whistling Swan from Back Bay, Virginia, 1961.

Species	(cc) Volume	% Volume Food	Times
Potamogeton perfoliatus	40.50	94.7	1
Najas guadalupensis	2.25	5.3	1
Total Vegetation	42.75	100.0	
Grit	2.25	(5.0)*	1
Lead Shot			0
Total Food	42.75	(95.0)*	1
Total Content	45.0		1

\* Percent of total content.

Table . **Gizzard** Contents of **76 Mallard** Ducks from Back Bay, Virginia and Currituck Sound, North Carolina. November 16, 1962 through December 29, 1962.

<b>Species</b>	<b>Volume (cc)</b>	<b>% Volume Food</b>	<b>Times</b>
Najas guadalupensis	53.88	19.2	17
Scirpus <b>robustus</b>	25.89	9.2	29
Scirpus americanus	23.81	8.5	35
Potamogeton pectinatus	22.37	8.0	24
Ruppia <b>maritima</b>	16.59	5.9	27
Echinockloa <b>walteri</b>	14.38	5.1	9
Potamogeton perfoliatus	10.43	3.7	22
Scirpus <b>validus</b>	10.05	3.6	14
Polygonum densiflorum	9.20	3.3	6
<b>Myrica</b> cerifera	6.91	2.5	20
Scirpus olneyi	6.56	2.3	20
<b>Vallisneria</b> americana	5.86	2.1	2
Zea mays	5.40	1.9	1
Distichlis spicata	5.11	1.8	12
Cyperus odoratus	2.37	.8	10
Eleocharis <b>quadrangulata</b>	2.37	.8	7
Polygonum <b>punctatum</b>	2.22	.8	11
Proserpinaca palustris	2.18	.8	7
<b>Chara</b> spp.	1.75	.6	2
Euphorbia spp.	1.50	.5	1
Eleocharis spp.	1.40	.5	1
Sparganium <b>americanum</b>	1.40	.5	4
Paspalum boscianutn	1.37	.5	1
<b>Eleocharis</b> parvula	1.31	.5	8
<b>Myrica</b> pensylvanica	1.10	.4	5
Vitis spp.	.85	.3	1
<b>Panicum</b> dichotomiflorum	.80	.3	2
Nyssa biflora	.75	.3	4
Potamogeton berchtoldii	.74	.3	6
Cladiutn jamaicensis	.72	.3	4
Spartina cynosuroides	.55	.2	5
Polygonum <b>pensylvanicum</b>	.53	.2	2
<b>Smilax</b> spp.	.49	.2	2
Eleocharis <b>palustris</b>	.36	.1	11
Cyperus polystachys	.35	.1	1
<b>Cyperus</b> spp.	.21	.1	1
Polygonum hydropiperoides	.18	.1	3
Hordeum <b>vulgare</b>	.17	.1	1
<b>Rubus</b> spp.	.17	.1	1
<b>Rumex</b> spp.	.16	.1	2
Carex spp.	.12	Trace	4
<b>Decodon</b> verticillatus	.12	Trace	3

Table (Cont'd) Gizzard Contents of 76 Mallard Ducks from Back Bay, Virginia and Currituck Sound, North Carolina. November 16, 1962 through December 29, 1962.

Species	Volume (cc)	% Volume Food	Times
Berchemia <b>scandens</b>	.11	Trace	1
Polygonum hydro Piper	.10	Trace	3
Ilex opaca	.08	Trace	1
Corpinus caroliniana	.06	Trace	1
Rhus copallina	.06	Trace	1
Ceratophyllum demersum	.05	Trace	1
Eleocharis <b>ovata</b> (type)	Trace		1
Eleocharis palustris (type)	Trace		2
Eleocharis <b>parvula</b> (type)	Trace		1
<b>Galium</b> spp.	Trace		2
Lepidium <b>virginicum</b>	Trace		1
Panicum agrostoides	Trace		1
Panicum spp.	Trace		1
Polygonum <b>aviculare</b>	Trace	-	
Unidentified vegetation	8.05	<u>2.9</u>	<u>11</u>
Total Vegetation	251.19	89.7	76
Pelecypoda	28.28	10.1	18
(Rangia cuneata)	(23.85)	(8.5)	(10)
( <b>Mytilopsis</b> leucopheata)	(.23)	(.1)	2
Amphipoda	.06	Trace	1
<b>Insecta</b>	.04	Trace	9
(Coleoptera)	(Trace)		(3)
Arthropoda	Trace		1
Gastropoda	Trace		1
Nematoda	Trace		1
Unidentified animal	<u>.60</u>	<u>.2</u>	2
Total Animal	28.98	10.3	28
Grit	195.60	(41.1)*	76
Lead Shot (volume & number)	Trace(1)		1
Gizzard <b>Worms</b>	Trace		3
Feathers	Trace		1
Total Food	280.17	(58.9)*	76
Total Content	475.77		76

\* Percent of total content.

Table . Gizzard Contents of 103 Black Ducks from Back Bay, Virginia and Currituck Sound, North Carolina. November 12, 1962 through December 24, 1962.

Species	Volume (cc)	% Volume Food	Times
Najas guadalupensis	44.39	13.3	24
Potamogeton pectinatus	41.34	12.4	45
Ruppia maritima	33.41	10.0	33
Scirpus olneyi	26.23	7.9	30
Scirpus robustus	19.80	6.0	23
Echinochloa walteri	13.50	4.1	8
Scirpus validus	12.56	3.8	16
Distichlis spicata	9.29	2.8	6
Polygonum punctatum	8.22	2.5	15
Zea mays	8.07	2.4	1
Scirpus americanus	6.73	2.0	19
Potamogeton perfoliatus	6.39	1.9	22
Myrica cerifera	5.82	1.7	16
Sagittaria subulata	5.21	1.6	3
Polygonum densiflorum	4.25	1.3	1
Chara spp.	4.20	1.3	1
Potamogeton berchtoldii	3.07	.9	3
Cladium jamaicensis	2.96	.9	9
Iris spp.	2.85	.9	3
Eleocharis parvula	2.73	.8	7
Myrica pensylvanica	2.58	.8	15
Cyperus odoratus	2.07	.6	10
Eleocharis olivacea	1.92	.6	5
Vallisneria americana	1.73	.5	6
Eleocharis palustris (type)	1.21	.4	9
Panicum dichotomiflorum	.98	.3	2
Eleocharis spp.	.84	.3	1
Polygonum pensylvanicum	.81	.2	3
Proserpinaca palustris	.69	.2	4
Spartina cynosuroides	.40	.1	1
Sparganium americanum	.19	.1	3
Echinochloa crusgalli	.14	Trace	1
Smilax spp.	.13	Trace	1
ixicodendron radicans	.13	Trace	2
Eleocharis palustris	.07	Trace	2
Hubus spp.	.06	Trace	2
Eleocharis quadrangulata	.04	Trace	2
Galium spp.	Trace		1
Ilex spp.	Trace		1
Ilex verticillata	Trace	-	1
Hhus copallina	Trace	-	1
Sida spp.?	Trace		1
Unidentified vegetation	1.62	.5	3

Table . (Cont'd) Gizzard Contents of 103 Black Ducks from Back Bay, Virginia and Currituck Sound, North Carolina. November 12, 1962 through **December** 29, 1962.

Species	Volume (cc)	% Volume Food	Times
Total Vegetation	276.63	<b>83.1</b>	103
Pelecypoda	54.32	16.3	36
(Rangia cuneata)	<b>(48.27)</b>	<b>(14.5)</b>	<b>(26)</b>
Pisces	.94	.3	1
Amphipoda (Gammarus spp.)	.48	.1	2
Gastropoda	.19	.1	2
<b>Insecta</b>	.11	Trace	<b>8</b>
(Diptera) I	<b>(.06)</b>	(Trace)	<b>(1)</b>
<b>(Hemiptera-Corixidae)</b>	<b>(.02)</b>	(Trace)	<b>(4)</b>
(Coleoptera)	<b>(Trace)</b>		<b>(1)</b>
Arachnida (Lycosidae)	<u>.02</u>	<u>Trace</u>	<u>2</u>
Total <b>Animal</b>	56.06	16.9	45
Grit	256.91	<b>(43.6)*</b>	103
Lead Shot (volume & number)	<b>Trace(11)</b>		6
Gizzard worms	Trace	-	3
Total Food	332.69	<b>(56.4)*</b>	103
Total Content	<b>589.60</b>		103

\* Percent of total content.

Table . Gizzard Contents of 109 Baldpate from Back Bay, Virginia and Currituck Sound, North Carolina. November 11, 1962 through December 29, 1962.

Species	Volume (cc)	% Volume Food	Times
<i>Najas guadalupensis</i>	117.78	40.3	79
<i>Ruppia maritima</i>	80.65	27.6	63
<i>Scirpus americanus</i>	15.40	5.3	26
<i>Potamogeton perfoliatus</i>	13.70	4.7	16
<i>Vallisneria americana</i>	8.83	3.0	11
<i>Scirpus robustus</i>	5.52	1.9	14
<i>Cladium jamaicensis</i>	5.10	1.7	5
<i>Salicornia</i> spp.	3.25	1.1	3
<i>Myrica pensylvanica</i>	3.16	1.1	6
<i>Scirpus validus</i>	2.71	.9	37
<i>Najas</i> spp.	2.50	.9	1
<i>Potamogeton pectinatus</i>	2.18	.7	13
<i>Scirpus olneyi</i>	2.03	.7	22
<i>Distichlis spicata</i>	1.60	.5	8
<i>Sagittaria subulata</i>	.60	.2	3
<i>Spartina cynosuroides</i>	.60	.2	2
<i>Eleocharis palustris</i>	.59	.2	12
<i>Potamogeton berchtoldii</i>	.55	.2	2
<i>Myriophyllum exalbescens</i> (type)	.40	.1	1
<i>Polygonum densiflorum</i>	.40	.1	2
<i>Eleocharis parvula</i>	.35	.1	8
<i>Chara</i> spp.	.31	.1	6
<i>Leptochloa fascicularis</i>	.28	.1	1
<i>Andropogon</i> spp.	.15	.1	1
<i>Fimbristylis</i> (caroliniana?)	.15	.1	1
<i>Polygonum hydropiper</i>	.15	.1	2
<i>Polygonum hydropiperoides</i>	.11	Trace	1
<i>Fimbristylis spadicea</i>	.10	Trace	1
<i>Lippia</i> (nodiflora?)	.10	Trace	3
<i>Polygonum pennsylvanicum</i>	.03	Trace	3
<i>Carex</i> spp.	Trace		1
<i>Cyperus odoratus</i>	Trace		2
<i>Eleocharis quadrangulata</i>	Trace		1
<i>Fimbristylis autumnalis</i>	Trace		1
<i>Ilex</i> spp.	Trace	-	2
<i>Myrica cerifera</i>	Trace		10
<i>Nyssa biflora</i>	Trace		1
<i>Panicum virgatum</i>	Trace		1
<i>Polygonum punctatum</i>	Trace		3
<i>Potamogeton</i> spp.	Trace		6
<i>Rumex</i> spp.	Trace		1
<i>Scirpus</i> (americanus?)	Trace		1
<i>Scirpus</i> spp.	Trace		4

Table . Gizzard Contents of **109** Baldpate from Back Bay, Virginia and **Currituck** Sound, North Carolina. November **11**, 1962 through December 29, **1962. (Cont'd)**

Species	Volume (cc)	% Volume Food	Times
Sparganium <b>americanum</b>	Trace		1
<b>Zannichellia</b> palustris	Trace	-	2
Unidentified vegetation	<u>14.79</u>	<u>5.1</u>	<u>21</u>
Total Vegetation	284.07	<b>97.1</b>	109
Pisces	<b>6.00</b>	2.1	2
Pelecypoda	2.01	.7	15
( Rangia <b>cuneata</b> )	(2.01)	(.7)	9
<b>Insecta</b>	<b>.50</b>	.2	3
Amphipoda	Trace	-	1
<b>Gastropoda</b>	Trace	-	2
<b>Nematoda</b>	Trace		1
Unidentified animal	<u>Trace</u>	<u>      </u>	<u>5</u>
Total Animal	8.51	2.9.	20
Grit	236.71	(44.5)*	109
Lead Shot (volume & number)	<b>.28(14)</b>	(.1)*	1
Gizzard lining	2.70	(.5)*	3
Feather	Trace		1
Total Food	292.58	(55.0)*	109
Total Content	<b>532.27</b>		109

\* Percent of total content.

Table . Gizzard Contents of 10 ~~Gadwall~~ Gadwall from Back Bay, Virginia and Currituck Sound, North Carolina. November through December 29, 1962.

Species	Volume (cc)	% Volume Food	Times
Ruppia maritima	39.26	86.7	7
Scirpus <b>robustus</b>	2.50	5.5	2
Distichlis spicata	1.12	2.5	3
Potamogeton perfoliatus	.90	2.0	1
Scirpus <b>validus</b>	.47	.9	2
Scirpus olneyi	.35	.7	2
Scirpus americanus	.24	.5	2
Potamogeton pectinatus	.20	.4	1
Carex spp.	.03	.1	2
<b>Bidens spp.</b>	Trace		1
Unidentified vegetation	<u>.20</u>	<u>.4</u>	<u>1</u>
Total Vegetation	45.27	100.0	10
Grit	10.76	(19.2)*	10
Total Food	45.27	(80.8)*	10
Total Content	56.03		10

\* Percent of total content.

Table . Gizzard Contents of 125 **Pintail** Ducks from Back Bay,  
**Virginia** and **Currituck** Sound, North Carolina. November 11,  
1962 through December 29, 1962.

Species	Volume (cc)	% Volume Food	Times
<i>Ruppia maritima</i>	60.14	16.1	65
<i>Scirpus olneyi</i>	38.04	10.2	66
<i>Najas guadalupensis</i>	36.98	9.9	31
<i>Potamogeton pectinatus</i>	34.65	9.3	48
<i>Scirpus americanus</i>	32.78	8.8	50
<i>Scirpus validus</i>	17.74	4.7	45
<i>Scirpus robustus</i>	14.02	3.7	36
<i>Myrica pensylvanica</i>	10.60	2.8	44
<i>Cyperus odoratus</i>	10.21	2.7	22
<i>Chara</i> spp.	9.52	2.5	18
<i>Eleocharis parvula</i>	8.46	2.3	20
<i>Distichlis spicata</i>	7.78	2.1	14
<i>Echinochloa walteri</i>	6.88	1.8	8
<i>Vallisneria americana</i>	6.13	1.6	7
<i>Potamogeton perfoliatus</i>	5.70	1.5	26
<i>Eleocharis palustris</i>	5.37	1.4	33
<i>Zarnichellia palustris</i>	5.25	1.4	
<i>Myrica cerifera</i>	5.08	1.4	3:
<i>Salicornia</i> spp.	4.73	1.3	2
<i>Zea mays</i>	4.38	1.2	2
<i>Eleocharis olivacea</i>	1.76	.5	12
<i>Smilax</i> spp.	1.42	.4	4
Algae	1.40	.4	2
<i>Polygonum punctatum</i>	1.39	.4	13
<i>Polygonum hydropiperoides</i>	1.17	.3	6
<i>Lippia nodiflora</i>	1.14	.3	12
<i>Polygonum densiflorum</i>	1.14	.3	5
<i>Sagittaria subulata</i>	.95	.3	3
<i>Polygonum setaceum</i>	.75	.2	1
<i>Myriophyllum pinnatum</i>	.50	.1	2
<i>Paspalum distichum</i>	.39	.1	2
<i>Eleocharis albida</i>	.36	.1	1
<i>Polygonum pensylvanicum</i>	.35	.1	2
<i>Cuscuta</i> spp.	.34	.1	5
<i>Potamogeton berchtoldii</i>	.33	.1	3
<i>Eleocharis quadrangulata</i>	.23	.1	2
<i>Polygonum sagittatum</i>	.13	Trace	2
<i>Proserpinaca palustris</i>	.12	Trace	2
<i>Rumex</i> spp.	.12	Trace	1
<i>Cladium jamaicensis</i>	.10	Trace	4
<i>Berchemia scandens</i>	.09	Trace	1

Table . (Cont'd) Gizzard Contents of 125 **Pintail** Ducks from Back Bay, Virginia and Currituck Sound, North Carolina. November 11, 1962 through December 29, 1962.

Species	Volume (cc)	% Volume Food	Times
Nyssa biflora	.09	Trace	1
<b>Spartina</b> cynosuroides	.09	Trace	1
Eleusine <b>indica</b>	.08	Trace	1
Toxicodendron <b>radicana</b>	.06	Trace	1
<b>Chamaecrista</b> nictitans	.05	Trace	1
<b>Rubus</b> spp.	.05	Trace	1
<b>Setaria</b> viridis	.05	Trace	1
Ilex opaca	.02	Trace	1
Brassica <b>rapa</b>	Trace	-	2
Carex spp.	Trace	-	4
Cyperus strigosus	Trace	-	1
Fimbristylia caroliniana	Trace	-	2
<b>Nitella</b> spp.	Trace	-	1
Potamogeton spp.	Trace	-	1
<b>Ranunculus</b> spp.	Trace	-	1
Unidentified vegetation	6.28	1.7	10
Total Vegetation	345.39	92.3	125
Pelecypoda (Bangia cuneata)	17.40	4.7	34
Gastropoda	4.80	1.3	2
<b>Insecta</b>	3.99	1.0	11
(Diptera)	(1.30)	(.3)	(1)
(Hymenoptera - Formicidae)	(1.20)	(.3)	(1)
(Odonata)	(1.02)	(.3)	(1)
(Coleoptera)	(.40)	(.1)	(2)
Amphipoda (Gammarus spp.)	2.58	.7	6
<b>Acarina</b>	Trace	-	6
Isopoda	Trace	-	1
Unidentified animal	Trace	-	2
Total Animal	28.77	7.7	45
Grit	207.73	(35.7)*	125
Lead Shot (volume & number)	Trace(8)		7
Total Food	374.16	(64.3)*	125
Total Content	581.89		125

\* Percent of total content.

Table . Gizzard Contents of 127 Green-winged Teal from Back Bay, Virginia and Currituck Sound, North Carolina. November 10, 1962 through December 29, 1962.

Species	Volume (cc)	% Volume Food	Times
<i>Eleocharis parvula</i>	12.74	16.3	68
<i>Scirpus olneyi</i>	10.36	13.2	64
<i>Scirpus validus</i>	7.75	9.9	56
<i>Ruppia maritima</i>	6.43	8.2	31
<i>Distichlis spicata</i>	4.34	5.5	17
<i>Scirpus americanus</i>	4.06	5.2	36
<i>Cyperus odoratus</i>	3.75	4.8	36
<i>Salicornia</i> spp.	2.84	3.6	5
<i>Eleocharis palustris</i>	2.71	3.5	58
<i>Eleocharis olivacea</i>	2.65	3.4	23
<i>Scirpus robustus</i>	2.62	3.3	27
<i>Bacopa monniera</i>	1.99	2.5	3
<i>Cladium jamaicensis</i>	1.90	2.4	12
<i>Potamogeton pectinatus</i>	1.61	2.1	13
<i>Lippia nodiflora</i>	1.51	1.9	32
<i>Potamogeton perfoliatus</i>	1.41	1.8	14
<i>Zea mays</i>	1.30	1.7	1
<i>Najas guadalupensis</i>	.86	1.1	5
<i>Vallisneria americana</i>	.78	1.0	2
<i>Chara</i> spp.	.71	.9	5
<i>Juncus roemerianus</i>	.60	.8	2
<i>Polygonum punctatum</i>	.59	.8	10
<i>Panicum dichotomiflorum</i>	.51	.7	3
<i>Kyrica cerifera</i>	.33	.4	9
<i>Potamogeton berchtoldii</i>	.30	.4	12
<i>Echinochloa walteri</i>	.28	.4	2
<i>Eleocharis albida</i>	.25	.3	2
<i>Eleocharis quadrangulata</i>	.14	.2	7
<i>Crataegus</i> spp.	.13	.2	1
<i>Polygonum pensylvanicum</i>	.10	.1	1
<i>Myriophyllum pinnatum</i>	.09	.1	2
<i>Myrica pensylvanica</i>	.07	.1	7
<i>Cuscuta</i> spp.	.05	.1	2
<i>Sparganium americanum</i>	.05	.1	2
<i>Fimbristylis castanea</i>	.04	.1	3
<i>Polygonum setaceum</i>	.04	.1	4
<i>Sagittaria subulata</i>	.04	.1	1
<i>Aster</i> spp.	.03	Trace	2
<i>Ranunculus</i> spp.	.03	Trace	3
<i>Nitella</i> spp.	.02	Trace	1
<i>Polygonum densiflorum</i>	.02	Trace	3
<i>Scirpus</i> spp.	.02	Trace	2

Table . (Cont'd) Gizzard Contents of 127 Green-winged Teal from Back Bay, Virginia and Currituck Sound, North Carolina. November 10, 1962 through December 29, 1962.

Species	Volume (cc)	% Volume Food	Times
Spartina cynosuroides	.02	Trace	1
<b>Carex</b> spp.	.01	Trace	1
Potamogeton spp.	.01	Trace	2
Proserpinaca palustris	.01	Trace	1
<b>Rubus</b> spp.	.01	Trace	2
Cyperus spp.	Trace		2
<b>Eragrostis</b> spp.	Trace		-1
Leptochloa fascicularis	Trace		1
<b>Paspalum</b> spp.	Trace		1
Polygonum densiflorum	Trace		1
Polygonum hydropiperoides	Trace		1
Polygonum <b>sagittatum</b>	Trace		1
Polygonum spp.	Trace		1
Rhynchospora spp.	Trace		1
<b>Zannichellia</b> palustris	Trace		1
Unidentified vegetation	<u>1.53</u>	<u>2.0</u>	<u>9</u>
Total Vegetation	77.64	99.0	127
<b>Insecta</b>	.41	.5	10
(Corixidae)	(.10)	(.1)	(1)
(Coleoptera)	(.02)	(Trace)	(1)
Amphipoda	.17	.2	2
Pelecypoda ( <b>Rangia</b> cuneata)	.17	.2	3
Gastropoda	.01	Trace	2
Arachnida	<u>Trace</u>		<u>2</u>
Total Animal	.76	1.0	18
Grit	64.95	(45.3)*	127
Total Food	78.40	(54.7)*	127
Total Content	143.35		127

\* Percent of the total content.

Table . Gizzard Contents of **3 Wood** Duck from Back Bay, Virginia and **Currituck** Sound, . North Carolina. November **24**, 1962 through **December 29**, 1962.

Species	(cc) Volume	% Volume Food	Times
<b>Zea</b> mays	3.60	61.5	1
Carpinus <b>caroliniana</b>	1.95	<b>33.4</b>	3
Sparganium <b>americanum</b>	.05	.9	1
Scirpus <b>olneyi</b>	Trace	-	1
Unidentified vegetation	<u>.25</u>	<u>4.3</u>	<u>1</u>
Total Vegetation	5.85	100.0	3
Grit	3.65	<b>(38.4)*</b>	3
Total Food	5.85	<b>(61.6)*</b>	3
Total Content	9.50		3

\* Percent of total content.

Table . Gizzard Contents of 3 Shoveler from Back Bay, Virginia and Currituck Sound, North Carolina. **November** 16, 1962 through December 8, 1962.

Species	Volume (cc)	% Volume Food	Times
Ruppia maritima	3.20	<b>32.7</b>	1
Distichlis spicata	2.70	<b>27.6</b>	2
Scirpus <b>robustus</b>	1.86	<b>19.0</b>	2
Vallisneria <b>americana</b>	1.20	12.2	1
<b>Cladium</b> jamaicense	<b>.80</b>	8.2	1
<b>Chara</b> spp.	<b>.02</b>	<b>.2</b>	1.
Scirpus <b>validus</b>	<b>.02</b>	<b>.2</b>	1
Carex spp.	Trace		1
Eleocharis <b>albida</b>	Trace	-	1
<b>Fimbristylis</b> spp.	Trace		1
Scirpus americanus	<u>Trace</u>	<u>      </u>	<u>1</u>
Total Vegetation	9.80	100.0	3
Coleoptera	Trace		1
Grit	9.20	<b>(48.4)*</b>	3
Total Food	9.80	<b>(51.6)*</b>	3
Total Content	19.00		3

\* Percent of total content.

Table . **Gizzard** Contents of 5 Canvasback from Back Bay, Virginia and Currituck Sound, North **Carolina**. December 1, 1962 through March 12, 1963.

Species	Volume (cc)	% Volume Food	Times,
<b>Vallisneria americana</b>	<b>8.40</b>	34.2	<b>2</b>
Potamogeton perfoliatus	7.95	<b>32.4</b>	<b>4</b>
<b>Potamogeton pectinatus</b>	3.95	<b>16.1</b>	3
Ruppia maritime	3.75	<b>15.3</b>	5
Melilotus alba	.50	2.0	1
<b>Cladium jamaicensis</b>	Trace	-	1
Myrica cerifera	Trace	-	1
Myrica <b>pennsylvanica</b>	Trace	-	1
Najas guadalupensis	Trace	-	1
<b>Polygonum hydropiper</b>	Trace	-	1
Proserpinaca palustris	Trace	-	1
<b>Rumex spp.</b>	<u>Trace</u>	<u>-</u>	<u>1</u>
Total Vegetation	24.55	100.0	5
Grit	18.95	(43.6)*	5
Lead Shot (number)	1		1
Total Food	24.55	(56.4)*	5
Total Content	<b>43.50</b>		5

\* Percent of total content.

Table . Gizzard Contents of 8 Redhead Ducks from Back Bag, Virginia.  
November 10, 1962 through December 21, 1962.

Species	(cc) Volume	% Volume Food	Times
Najas guadalupensis	24.23	60.2	5
Potamogeton pectinatus	9.60	23.9	3
Ruppia <b>maritima</b>	5.90	14.7	3
Potamogeton perfoliatus	.50	<u>1.2</u>	<u>1</u>
Total Vegetation	40.23	100.0	8
Pelecypoda ( <b>Rangia</b> cuneata)	Trace		1
Total Animal	Trace		1
Grit	33.78	(45.6)*	8
Total Food	40.23	(54.4)*	8
Total Content	74.01		8

\* Percent of total content.

Table . Gizzard Contents of **179 Ringneck** Ducks from Back Bay, Virginia and Currituck Sound, North Carolina. **November 10, 1962** through December 29, 1962.

Species	Volume (cc)	% Volume Food	Times
Potamogeton pectinatus	104.81	28.8	<b>113</b>
Potamogeton perfoliatus	<b>59.71</b>	16.4	102
Ruppia maritima	<b>55.95</b>	15.4	121
Vallisneria americana	<b>25.15</b>	6.9	<b>29</b>
Najas guadalupensis	<b>19.50</b>	5.4	20
Nymphaea odorata	10.50	2.9	<b>7</b>
<b>Chara</b> spp.	<b>5.51</b>	1.5	<b>8</b>
Brasenia schreberi	<b>3.14</b>	.9	<b>3</b>
Characeae	<b>2.85</b>	.8	2
<b>Cladium</b> jamaicensis	<b>2.31</b>	.6	21
Scirpus americanus	<b>2.24</b>	.6	19
Zea mays (Bait)	1.28	.4	1
Scirpus olneyi	1.16	.3	20
Potamogeton berchtoldii (type)	1.05	.3	1
<b>Myrica</b> cerifera	.89	.2	<b>19</b>
<b>Myriophyllum</b> (spicatum?)	.80	.2	<b>1</b>
Eleocharis quadrangulata	.77	.2	4
Sparganium americanum	.75	.2	7
<b>Myrica</b> pennsylvanica	.62	.2	7
Polygonum amphibium	.60	.2	1
Potamogeton spp.	.60	.2	10
Echinochloa <b>walteri</b>	.50	.1	1
Eleocharis <b>parvula</b>	.50	.1	4
Polygonum punctatum	.50	.1	3
Scirpus <b>validus</b>	.44	.1	5
Cyperus spp.	.30	.1	2
Panicum <b>capillare</b>	.30	.1	1
Potamogeton berchtoldii	.30	.1	8
Nyssa <b>biflora</b>	.29	.1	4
<b>Galium</b> spp.	.26	.1	4
Descurainia <b>pinnata</b>	.20	.1	1
Potamogeton (richardsonii?)	.15	Trace	1
Polygonum spp.	.14	Trace	<b>5</b>
Carex spp.	.10	Trace	2
Fimbristylis <b>castanea</b>	.10	Trace	1
<b>Melilotus</b> spp.	.10	Trace	2
Panicum dichotomiflorum	.10	Trace	2
Polygonum hydropiper	.10	'Trace	1
Scirpus <b>robustus</b>	.10	'Trace	<b>5</b>
Panicum <b>virgatum</b>	.06	Trace	1
Scirpus (validus?)	.06	Trace	1
<b>Ceratophyllum demersum</b>	.04	Trace	1

Table . Gizzard Contents of 179 Ringneck Ducks from Back Bay, Virginia and Currituck Sound, North Carolina. November 10, 1962 through December 29, 1962. ( Cont'd. )

Species	Volume (cc)	% Volume F o o d	Times
Polygonum <b>densiflorum</b>	.03	Trace	2
Rudbeckia spp.	.03	Trace	1
Proserpinaca palustris	.02	Trace	2
Algae	Trace		2
Cornus spp.	Trace		1
Cyperus odoratus	Trace		1
Eleocharis palustris	Trace		4
Eragrostis spp.	Trace		1
Ilex spp.	Trace		1
Lippia nodiflora	Trace		1
Myrica spp.	Trace		2
Myriophyllum spicatum	Trace		1
Pinus spp.	Trace		1
Polygonum(aviculare?)	Trace	-	1
Potamogeton gramineus	Trace		1
Hhus copallina	Trace		1
Rosa palustris	Trace		- 1
Sagittaria subulata	Trace	-	1
Smilax spp.	Trace		1
Unidentified vegetation	3 . 6 5	<u>1.0</u>	<u>12</u>
Total Vegetation.	308.56	84.9	178
Pelecypoda	46.64	12.8	78
(Rangia cuneata)	(41.36)	(11.4)	(42)
(Mytilopsis leucopheata)	(Trace)	-	(1)
Insecta	4.14	1.1	11
(Gdonata)	(4.00)	(1.1)	(1)
(Diptera)	(.14)	(Trace)	(2)
(Coleoptera)	(Trace)		(2)
Gastropoda	3.68	1 . 0	7
Isopoda (Cyathura polita)	.20	.1	1
Amphipoda (Gammarus spp.)	.10	Trace	2
Acarina	Trace		1
Unidentified animal'	<u>.01</u>	<u>Trace</u>	<u>3</u>
Total Animal	54.77	15.1	90
Grit	420.49	(53.6)*	179
Lead Shot (volume & number)	Trace(22)	-	17
Gizzard Lining	1.15	(.1)*	2
Total Food	363.33	(46.3)*	179
Total Content	784.97		179

\* Percent of total content.

Table . Gizzard Contents of 73 Greater and Lesser **Scaup** from Back Bay, Virginia and Currituck Sound, North Carolina. November 11, 1962 through December 29, 1963.

Species	Volume (cc)	% Volume Food	Times
Potamogeton pectinatus	36.83	20.2	48
Najas guadalupensis	18.36	10.1	13
Zea mays (Bait)	15.93	8.7	2
Potamogeton perfoliatus	14.64	8.0	34
Vallisneria americana	9.10	5.0	16
Ruppia maritima	8.62	4.7	44
<b>Chara</b> spp.	8.57	4.7	13
Sagittaria subulata	2.85	1.6	2
Scirpus americanus	2.54	1.4	10
Cladium jamaicensis	.75	.4	10
Myrica pensylvanica	.54	.3	6
<b>Scirpus</b> olneyi	.30	.2	6
Nyssa biflora	.10	.1	1
Myrica cerifera	.08	Trace	10
Toxicodendron <b>radicans</b>	.06	Trace	2
Potamogeton spp.	.04	Trace	10
Brasenia schreberi	.02	Trace	1
Scirpus <b>robustus</b>	.02	Trace	1
Carex spp.	Trace	--	1
Distichlis spicata	Trace	--	1
Eleocharis albida	Trace	--	1
Eleocharis palustris (type)	Trace	--	1
Polygonum punctatum	Trace	--	1
Polygonum spp.	Trace	--	1
Potamogeton berchtoldii	Trace	--	1
Proserpinaca palustris	Trace	--	1
Scirpus spp.	Trace	--	1
Scirpus <b>validus</b>	Trace	--	5
Unidentified vegetation	<u>8.52</u>	<u>4.7</u>	8
Total Vegetation	127.87	70.0	71
Pelecypoda	52.01	28.5	<b>54</b>
(Rangia cuneata)	(44.57)	(24.4)	<b>(35)</b>
(Mytilopsis leucopheata)	(.15)	(.1)	<b>(1)</b>
Gastropoda	2.64	1.4	10

Table .(Cont'd) Gizzard Contents of 73 Greater and Lesser Scaup from Back Bay, Virginia and Currituck Sound, North Carolina. November 11, 1962 through December 29, 1962.

Species	Volume (cc)	% Volume Food	Times
<b>Insecta</b>	<b>.13</b>	<b>.1</b>	4
Amphipoda	Trace		2
Nematoda	<u>Trace</u>	<u>        </u>	<u>2</u>
Total Animal	54.78	30.0	56
Grit	150.17	(45.1)*	73
Feathers	Trace	-	3
Lead Shot ( volume & number )	Trace(26)	-	16
Total Food	182.65	(54.9)*	73
Total Content	332.82		73

\* Percent of total content.

Table . Gizzard Contents of 12 **\*\*Blackheads** from Back Bay, Virginia.  
December 3, 1962 through December 26, 1962.

Species	Volume (cc)	% Volume Food	Times
Potamogeton pectinatus	10.03	-28.7	9
Ruppia <b>maritima</b>	<b>5.41</b>	15.5	7
Potamogeton perfoliatus	.74	2.1	6
Scirpus <b>americanus</b>	.54	1.5	3
Myrica cerifera	.53	1.5	4
Scirpus <b>validus</b>	.45	1.3	3
Myrica <b>pensylvanica</b>	.35	1.0	1
Vallisneria <b>americana</b>	.25	.7	1
Scirpus <b>olneyi</b>	.24	.7	3
Chara spp.	.20	.6	1
Cladium jamaicensis	.20	.6	1
Polygonum hydropiper	.14	.4	1
Smilax spp.	.10	.3	1
Potamogeton spp.	.10	.3	1
Sparganium <b>americanum</b>	.03	.1	1
Eleocharis palustris	Trace		1
Scirpus spp.	Trace		1
Unident. <b>Cyperaceae</b>	Trace	-	1
Unidentified vegetation	<u>7.93</u>	<u>22.7</u>	<u>5</u>
Total Vegetation	27.24	78.1	11
<b>Pelecypoda</b> ( Rangia cuneata )	7.66	21.9	5
Grit	20.16	(36.6)*	12
Total Food	34.90	(63.4)*	11
Total Content	55.06		12

\* Percent of total content.

\*\* Scaup and Ringneck Duck combined.

Table . Gizzard Contents of 104 Ruddy Ducks from Back Bay, Virginia and Currituck Sound, North Carolina. November 14, 1962 through December 29, 1962.

species	Volume (cc)	% Volume Food	Times
Vallisneria americana	33.24	24.8	30
Potamogeton pectinatus	30.65	22.9	54
Ruppia maritima	18.51	13.8	89
Chara spp.	14.47	10.8	40
Potamogeton perfoliatus	13.53	10.1	72
Potamogeton spp.	1.88	1.4	19
Najas guadalupensis	1.27	.9	30
Scirpus americanus	.83	.6	8
Cladium jamaicensis	.38	.3	3
Myrica cerifera	.06	Trace	7
Chenopodium spp.	.03	Trace	1
Potamogeton berchtoldii	.03	Trace	3
Eleocharis spp.	.02	Trace	1
Scirpus olneyi	.02	Trace	5
Scirpus spp.	.02	Trace	3
Eleocharis quadrangulata	.01	Trace	1
Scirpus validus	.01	Trace	10
Algae	Trace		2
Berchemia scandescens	Trace	-	1
Cyperus odoratus	Trace	-	2
Cyperus spp.	Trace	-	2
Cyperus strigosus	Trace	-	1
Digitaria sanguinalis	Trace	-	1
Distichlis spicata	Trace	-	2
Eleocharis palustris	Trace	-	2
Juncus spp.	Trace	-	1
Nitella spp.	Trace	-	3
Polygonum punctatum	Trace	-	1
Polygonum spp.	Trace	-	2
Potentilla spp.	Trace	-	1
Rumex spp.	Trace	-	1
Unidentified vegetation	<u>3.17</u>	<u>2.4</u>	<u>18</u>
Total Vegetation	118.13	88.2	104
Pelecypoda	12.22	9.1	13
(Rangia cuneata)	(11.02)	(8.2)	(11)
(Bytilopsis leucopheata)	(.20)	(.1)	(2)
Amphipoda (Gammarus spp.)	3.56	2.7	41
(Leptocheirus plumulosus)	(Trace)		(1)
Odonata	.05	Trace	2
Acarina	.02	Trace	2

Table . **(Gont'd)** Gizzard Contents of 104 Ruddy Ducks from Back Bay, Virginia and Currituck Sound, North Carolina. November 14, 1962 through December 29, 1962.

Species	Volume (cc)	% Volume Food	Times
Arachnida	Trace	-	1
<b>Insecta</b>	Trace	-	5
Gastropoda	Trace	-	5
Isopoda	Trace	-	3
Nematoda	<u>Trace</u>	<u>-</u>	<u>5</u>
Total Animal	<b>15.85</b>	11.8	57
Grit	<b>153.44</b>	<b>(53.4)*</b>	104
Lead Shot (volume & number)	<b>Trace(8)</b>		4
<b>Total Food</b>	<b>133.98</b>	<b>(46.6)*</b>	<b>104</b>
Total Content	<b>287.42</b>		104

\* Percent of total content.

Table . Gizzard Contents of **1 American** Goldeneye from Back Bay,  
Virginia. December **3**, 1962.

Species	Volume (cc)	% Volume Food	Times
Ruppia maritima	.24	80.0	1
Potamogeton perfoliatus	.03	10.0	1
<b>Myrica</b> cerifrra	.03	10.0	1
<b>Ranunculus</b> pennsylvanicus	<u>Trace</u>	<u>      </u>	<u>1</u>
Total Vegetation	.30	100.0	1
Grit	2.70	(90.0)*	1
<b>Total</b> Food	.30	(10.0)*	1
Total Content	3.00		1

\* Percent of total content.

Table            **Gizzard Contents** of 1 American **Scoter** from Back Bay, Virginia.  
. November 29, 1962.

<b>Species</b>	<b>Volume (cc)</b>	<b>% Volume Food</b>	<b>Times</b>
Ruppia <b>maritima</b>	<u>.01</u>	2.0	1
Unidentified vegetation	<u>.20</u>	39.2	<u>1</u>
Total Vegetation	<b>.21</b>	<b>41.2</b>	1
Pelecypode	<b>.30</b>	<b>58.8</b>	1
Grit	<b>.00</b>	<b>(0.0)*</b>	0
Total Food	<b>.51</b>	<b>(100.0)*</b>	1
Total Content	<b>.51</b>		1

\* Percent of total content,

Table . Gizzard Contents of 109 Canada Geese from Back Bay,  
Virginia and Currituck Sound, North Carolina. November  
11, 1962 through January 8, 1963.

Species	Volume (cc)	% Volume Food	Times
Najas guadalupensis	397.77	36.5	44
Ruppia <b>maritima</b>	<b>141.71</b>	13.0	29
<b>Zea mays</b>	49.20	<b>4.5</b>	2
Potamogeton perfoliatus	35.13	<b>3.2</b>	<b>10</b>
Scirpus olneyi	22.90	2.1	<b>14</b>
Scirpus <b>robustus</b>	21.27	1.9	19
Scirpus americanus	<b>21.15</b>	1.9	20
Potamogeton pectinatus	19.60	1.8	6
Cyperus spp.	19.50	1.8	1
Distichlis <b>spicata</b>	17.61	1.6	8
<b>Gramineae</b> ( Unident. )	15.00	1.4	<b>2</b>
<b>Chara</b> Spp.	12.51	1.1	<b>8</b>
<b>Trifolium</b> spp.	<b>11.35</b>	1.0	3
Eleusine <b>indica</b>	7.25	<b>.7</b>	<b>3</b>
<b>Stellaria</b> spp.	5.92	<b>.5</b>	<b>4</b>
Sagittaria <b>subulata</b>	5.77	<b>.5</b>	<b>5</b>
Vallisneria <b>americana</b>	5.03	<b>.5</b>	<b>4</b>
Eleocharis <b>palustris</b>	<b>5.00</b>	<b>.5</b>	1
Digitaria ischaemum	<b>4.83</b>	<b>.4</b>	<b>5</b>
Eleocharis <b>parvula</b>	<b>3.40</b>	<b>.3</b>	<b>3</b>
Cyperus compressus	<b>2.64</b>	<b>.2</b>	1
<b>Nitella</b> spp.	<b>2.60</b>	<b>.2</b>	1
<b>Digitaria sanguinalis</b>	1.61	<b>.1</b>	<b>2</b>
<b>Myrica pensylvanica</b>	1.31	<b>.1</b>	<b>4</b>
<b>Carex</b> spp.	<b>.95</b>	<b>.1</b>	2
Scirpus <b>validus</b>	<b>.88</b>	<b>.1</b>	7
Ipomoea <b>lacunosa</b>	<b>.66</b>	<b>.1</b>	1
Ambrosia artemisiaefolia	<b>.57</b>	<b>.1</b>	1
Scirpus spp.	<b>.44</b>	Trace	1
Digitaria spp.	<b>.35</b>	Trace	2
Polygonum punctatum	<b>.27</b>	Trace	2
<b>Myrica cerifera</b>	<b>.22</b>	<b>Trace</b>	2
Eleocharis <b>albida</b>	<b>.17</b>	Trace	<b>1</b>
Cladium jamaicensis	Trace		<b>3</b>
Cyperus odoratus	Trace		1
Leptochloa <b>fascicularis</b>	Trace		1
<b>Mollugo verticillata</b>	Trace		1
<b>Myriophyllum spicatum</b>	Trace		1
<b>Pinus ( taeda ? )</b>	Trace	-	<b>1</b>
Polygonum hydropiperoides	Trace	-	<b>3</b>

Table . (Cont'd.) Gizzard Contents of 109 Canada Geese from Back Bay, Virginia and Currituck Sound, North Carolina. November 11, 1962 through January 8, 1963.

Species	Volume (cc)	% Volume Food	Times
Salicornia spp.	Trace		1
Rumex acetosella	Trace	-	1
Unidentified vegetation	<u>256.49</u>	<u>23.5</u>	<u>39</u>
Total Vegetation	1091.06	100.0	109
<b>Acarina</b>	Trace		1
Amphipoda	Trace		1
<b>Nematoda</b>	<u>Trace</u>		<u>2</u>
Total Animal.	Trace		4
Grit	937.94	(46.2)*	109
Feathers	Trace		1
Lead Shot ( volume & number )	<b>Trace(13)</b>	-	7
Total Food	1091.06	(53.8)*	109
Total Content	2029.00		109

\* Percent of total content.

Table . Gizzard Contents of 1 American Brant from Currituck Sound,  
North Carolina. December 24, 1962.

Species	Volume (cc)	% Volume Food	Times
Ruppia <i>maritima</i>	4.60	100.0	1
Chara spp.	<u>Trace</u>	<u>-</u>	<u>1</u>
Total Vegetation	4.60	100.0	1
Grit	6.90	(60.0)*	1
Total Food	4.60	(40.0)*	1
Total Content	11.50		1

\* Percent of total content.

Table . Gizzard Contents of **117** Coot from Back Bay, Virginia and Currituck Sound, North Carolina. November **11**, 1962 through December 29, 1962.

Species	Volume (cc)	% Volume Food	Times
Najas guadalupensis	622.36	90.1	116
<b>Chara</b> spp.	22.82	<b>3.3</b>	27
Ruppia maritima	12.12	<b>1.8</b>	21
Potamogeton pectinatus	9.92	<b>1.4</b>	12
Vallisneria mericana	7.40	1.1	17
Eleocharis <b>parvula</b>	5.10	<b>.7</b>	<b>4</b>
Potamogeton <b>perfoliatus</b>	4.34	<b>.6</b>	<b>14</b>
<b>Sagittaria subulata</b>	1.21	<b>.2</b>	3
Eleocharis palustris	<b>.72</b>	<b>.1</b>	2
Scirpus olneyi	<b>.07</b>	Trace	6
Eleocharis parvula (type)	Trace		1
Myrica cerifera	Trace		<b>2</b>
<b>Nitella</b> spp.	Trace		<b>3</b>
Potamogeton spp.	Trace		3
<b>Rubus</b> spp.	Trace		2
Scirpus spp.	Trace		1
Scirpus <b>americanus</b>	Trace		6
Scirpus <b>robustus</b>	Trace		2
Scirpus <b>validus</b>	Trace		10
Unidentified vegetation	Trace		<b>3</b>
Total Vegetation	686.06	99.3	<b>117</b>
Pelecypoda	4.80	<b>.7</b>	18
(Rangia cuneata)	(4.80)	<b>(.7)</b>	<b>(6)</b>
( <b>Mytilopsis</b> leucopheata)	(Trace)		<b>(12)</b>
<b>Insecta</b>	<b>.21</b>	Trace	<b>1</b>
Bryozoa ( <b>Plumatella</b> spp.)	Trace		1
Total Animal	5.01	<b>.7</b>	20
Grit	309.71	<b>(30.9)*</b>	<b>117</b>
Lead Shot (volume & number)	<b>Trace(2)</b>		2
Fish Leader	<b>.33</b>	Trace	1
Total Food	691.07	<b>(69.0)*</b>	117
Total Content	1001.11		<b>117</b>

\* Percent of total content.

Table . Gizzard Contents of 21 Whistling Swan from Back Bay, Virginia and Currituck Sound, North Carolina. November 25, 1962 through February 22, 1963.

Species	Volume (cc)	% Volume Food	Times
Najas guadalupensis	103.89	58.3	10
Potamogeton pectinatus	20.29	11.4	12
Potamogeton perfoliatus	17.86	10.0	4
<b>Vallisneria americana</b>	<b>14.79</b>	<b>8.3</b>	<b>2</b>
Ruppia maritima	13.85	7.8	14
<b>Chara spp.</b>	<b>4.26</b>	<b>2.4</b>	<b>4</b>
<b>Myrica cerifera</b>	2.21	1.2	6
Scirpus americanus	1.00	.6	4
Algae	Trace		1
Scirpus robustus	Trace	-	1
Unidentified vegetation	Trace	-	1
Total Vegetation	178.15	100.0	20
Isopoda ( <b>Cyathura polita</b> )	Trace	-	1
Pelecypoda ( <b>Rangia cuneata ?</b> )	Trace	-	2
Total Animal	Trace	-	2
Total Food	178.15	(44.6)*	20
Grit	219.25	(54.9)*	21
Lead Shot ( volume & number )	1.60 (82)	(0.4)*	3
Gizzard worms	Trace	-	2
Total Content	399.00		21

\* Percent of total content.