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Waterfowl Trends in Back Bay, Virginia from 1954 to 1990

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Introduction

Back Bay, Virginia and Currituck Sound, North Carolina have long been noted and highly acclaimed as prime waterfowl wintering and migration areas. Although no formal waterfowl surveys were conducted prior to 1937, some gauge of waterfowl abundance can be obtained from harvest record examination. Harvest estimates based on "extraordinarily well kept and recorded data" of ten major waterfowl hunting clubs in Back Bay and Currituck Sound between 1872 and 1962 (Sincock, 1966) suggest that five million (5,000,000) ducks and 560,000 Canada geese were taken by hunting during that 90-year period. Waterfowl population trends in Back Bay for the 37-year period 1954-90 are the subject of this paper.

Methods

Independent periodic waterfowl surveys have been conducted by personnel of Back Bay National Wildlife Refuge and the Virginia Department of Game and Inland Fisheries. Data from these surveys were not used in this analysis because of limited geographic coverage, surveys omitted some years, and the high rate of turnover of survey personnel and variability in experience and ability to census waterfowl populations.

Usable data sets were narrowed to Audubon Christmas Bird Counts and Mid-Winter Waterfowl Inventories. The former counts have been conducted by qualified volunteers of the Audubon Society annually for fifty years during the week between Christmas and New Year's in conjunction with similar counts nationwide. The Back Bay Circle, the sampled area, is a 15-mile diameter circle with its center located approximately 1 1/2 mile east of Back Bay Station in the City of Virginia Beach. The counts are made primarily from the ground by vehicle or

walking, however boats and aircraft augment the ground survey some years.

Mid-Winter Inventories (MWI) are annual waterfowl surveys conducted by U. S. Fish and Wildlife Service and/or state wildlife agency personnel. These surveys are coordinated nationwide and are scheduled during the first week of January but occasionally continue into the second week. The Back Bay survey unit, Virginia Zone 4, Segment 14, extends from Dam Neck west to U. S. Route 17, south to the North Carolina state line, east along the state line to the Atlantic Ocean, then north to Dam Neck. The Back Bay survey is aerial and is coordinated with personnel in North Carolina so that Currituck Sound and Back Bay can be surveyed the same day, usually by the same personnel. Such coordination is done to minimize and hopefully eliminate duplication or omission errors of cohorts of birds utilizing habitats on both sides of the state line.

Although Mid-Winter Inventories in the Back Bay survey unit date back to 1937, the waterfowl trends in this presentation will begin with the 1954 survey because data is missing for the years 1941, 1946, 1948, 1952 and 1953 (Sincock, 1966).

Back Bay waterfowl counts from both Audubon Christmas Bird Counts and Mid-Winter Inventories were compared for the 37-year period, 1954-90. Both surveys showed similar fluctuations in waterfowl numbers. The Mid-Winter Inventory data are used in this paper because of the complete aerial coverage of the survey unit, the coordination of survey timing with North Carolina and the ability to relate to Virginia and Atlantic Flyway data for comparable periods.

Linear regression analysis was made on certain waterfowl species or groups of species for the entire 37-year period 1954-90 as well as for the last 10-year period 1981-90.

As a note of interest, the trend in presence of submerged aquatic vegetation (SAV) in Back Bay was graphed and compared to certain species groups and to total waterfowl. Since the annual SAV surveys were conducted in late summer or early fall, the wild bird populations that utilized a summer or fall standing crop were the birds surveyed during the MWI in January of the following calendar year. Thus the SAV percent frequency values appearing in Figures 9-12 are included in the next calendar year to correspond to the correct generation of birds which utilized the plants.

Trends

Dabbling ducks (also known as puddle or tip-up ducks) in Back Bay show highly variable numbers over the 37-year period under consideration. The dabbling ducks have exhibited a statistically significant decline over the last 10-year period ($P < 0.04$); however the 37-year decline barely misses being statistically significant ($P = 0.0532$) (Figure 1). Dabbling duck trends declined but at a much slower rate over the last 10-year period in Virginia and in the Atlantic Flyway (FWS-OMBM files).

Figure 2 graphically shows Back Bay population trends in gadwall and American wigeon, two dabbling duck species highly dependent on SAV food production in the bay habitat (Sincock, 1966).

Diving duck species in Back Bay (Figure 3) have shown a statistically significant dramatically declining trend since 1954 ($P < 0.001$) as contrasted to a stable or only slightly declining trend at the Virginia and Flyway levels (FWS-OMBM files).

The greater snow goose (Figure 4) has exhibited a significant decline since 1954 in Back Bay ($P < 0.03$) while Flyway numbers of this species have increased from an annual average of 47,000 in 1954-59 to 163,000 in 1986-90 (FWS-OMBM files).

The Canada goose (Figure 5) has shown a statistically significant decline in Back Bay since 1954 ($P < 0.001$) while Virginia and Atlantic Flyway populations have increased during the same period (FWS-OMBM files).

The Back Bay population of tundra swan (Figure 6) has declined significantly since 1954 ($P < 0.03$) while the Atlantic Flyway population has steadily increased (FWS-OMBM files).

Although the American coot is a member of the family Rallidae and not a true waterfowl species, it is included here because of its close association with waterfowl groups addressed in this paper

and because of coot dependence on submerged aquatic vegetation. Although the declining trend in Back Bay coot numbers is not statistically significant, Figure 7 shows the dramatic variations. No coots have been counted during the mid-winter inventory in Back Bay since 1980; Audubon Christmas Bird Counts show a very similar trend. Coot populations in the Atlantic Flyway have remained stable since 1954 (FWS-OMBM files).

Total waterfowl numbers in the Back Bay survey unit (Figure 8) have exhibited a statistically significant declining trend between 1954 and 1990 ($P < 0.001$) (FWS-OMBM files).

Many factors influence waterfowl populations: (a) natural and hunting mortality, (b) production affected by breeding populations and nesting/brood habitat conditions, and (c) distribution which can be affected by all of the preceding factors plus the condition and abundance of migration and wintering habitat. The declining trend of many waterfowl species or species groups in Back Bay are contrary to Virginia or Atlantic Flyway trends. Such evidence suggests the declines are not entirely a result of mortality or production functions. Extreme care must be exercised not to over simplify cause and effect relationships in dynamic wild natural systems. The following data are presented for your interpretation. Figure 9 shows the percent frequency of submerged aquatic vegetation 1959-1990 (actually sampled early fall 1958-early fall 1989). (Coggin, 1966 and 1968; Schwab, 1985, et al. 1988; Settle and Coggin, 1975 and 1976; and Settle and Taylor, 1979). Two periods of abundant SAV occur from 1959 to 1964 and again from 1972 to 1981 where percent frequency of SAV equalled or exceeded 50. The periods of low SAV abundance below 50% frequency were 1965 to 1971 and from 1982 to 1990. The last six consecutive years, 1985-1990, have averaged below 10% SAV frequency in Back Bay. The 1 to 8 percent frequency of SAV noted in recent years is the lowest recorded in the 32 years of SAV monitoring.

The graphs shown in Figures 10-12 show SAV abundance superimposed on dabbling ducks, bay feeding dabbling ducks (gadwall and wigeon) and total waterfowl numbers from Back Bay Mid-Winter Inventories. With few exceptions, it appears that when SAV is abundant in Back Bay, waterfowl numbers increase; when SAV is scarce, waterfowl numbers decrease.

Sincock (1966) suggested that waterfowl distribution in Back Bay, Virginia was more influenced by SAV than in Currituck Sound, North

Carolina during his 1958-63 investigations. He also inferred that because many waterfowl species are relatively short lived, migratory patterns and habits could be negatively influenced by several years of poor food production on the wintering grounds.

Summary

Thirty seven (37) years of Mid-Winter Waterfowl Inventories of Back Bay, Virginia, 1954-90, indicate statistically significant declines in numbers of many waterfowl species or groups of species such as diving ducks, greater snow goose, Canada goose, tundra swan, American coot and total waterfowl. Dabbling duck numbers showed a significant decline over the past 10-year period. (Figures 1-8).

Comparison of submerged aquatic vegetation abundance and waterfowl trends in Back Bay, Virginia is shown graphically in Figures 9 - 12. The graphs generally suggest a direct relationship between SAV abundance and waterfowl numbers.

Acknowledgement

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TOTAL DABBLING DUCKS - BACK BAY, VA

Mid-Winter Inventories - 1954-1990

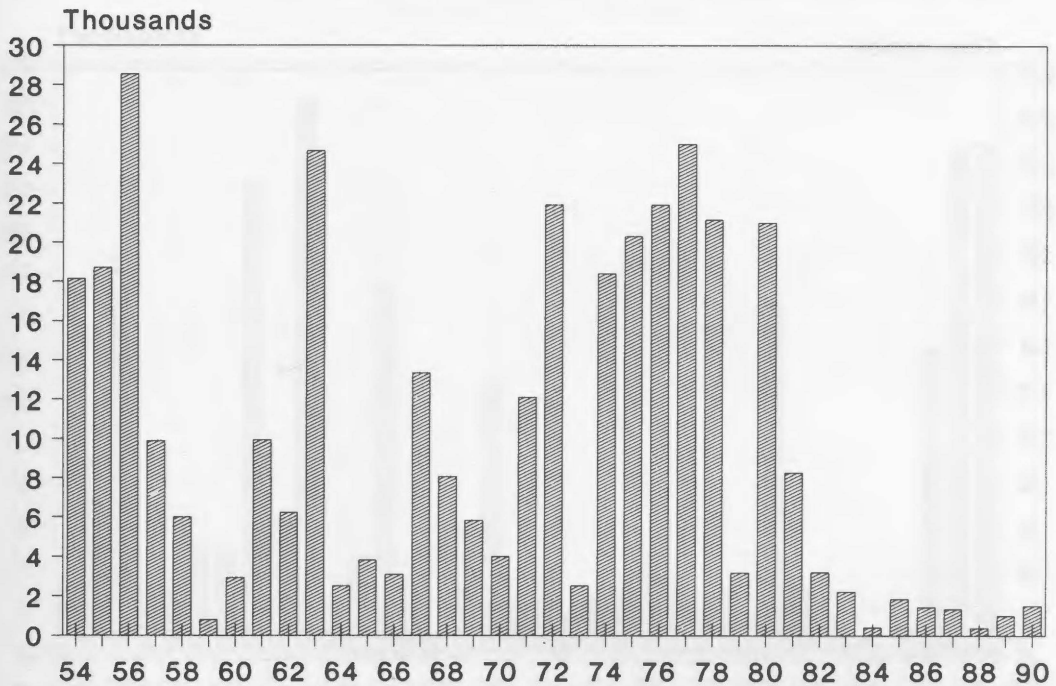


Figure 1. Total Dabbling Ducks - Back Bay, VA

BAY FEEDING DUCKS - BACK BAY, VA

Mid-Winter Inventories - 1954-1990

Gadwall and Wigeon

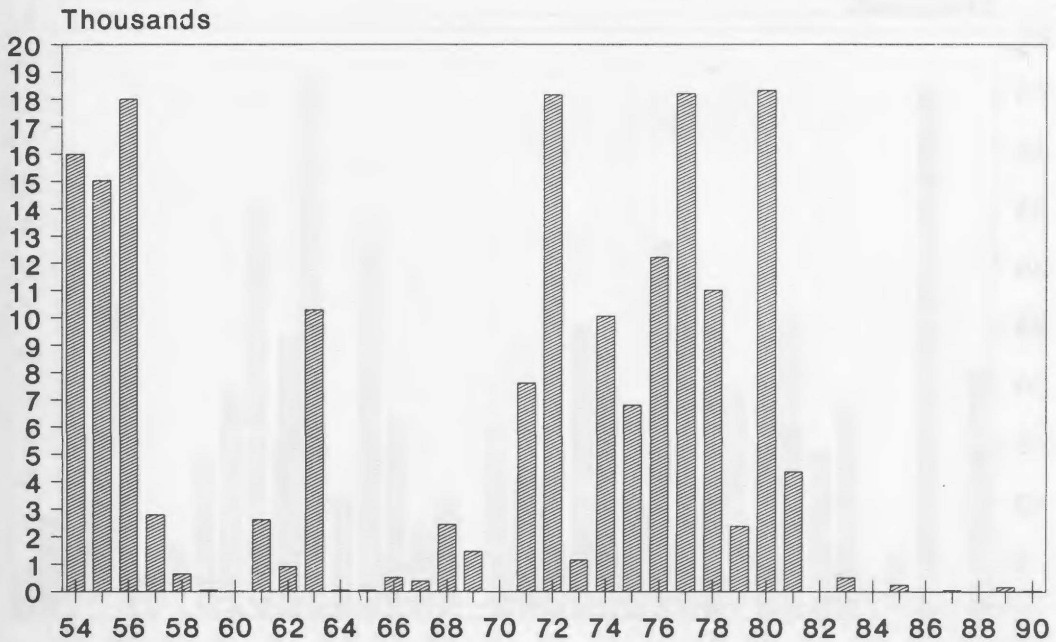


Figure 2. Bay Feeding Ducks - Back Bay, VA

TOTAL DIVING DUCKS - BACK BAY, VA

Mid-Winter Inventories - 1954-1990

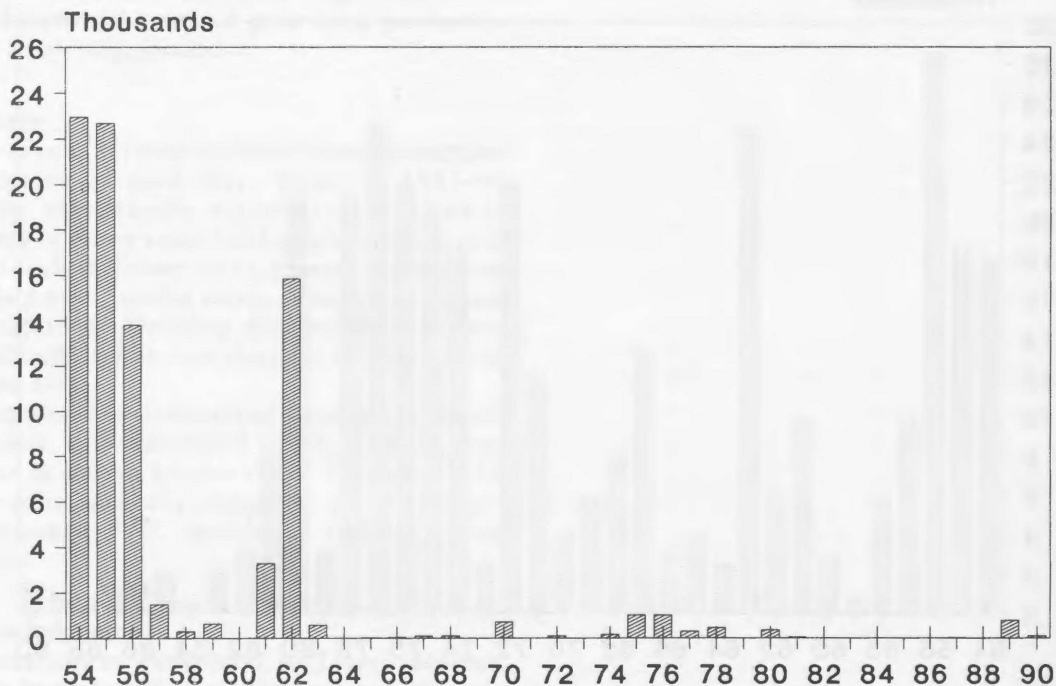


Figure 3. Total Diving Ducks - Back Bay, VA

SNOW GEESE - BACK BAY, VA

Mid-Winter Inventories - 1954-1990

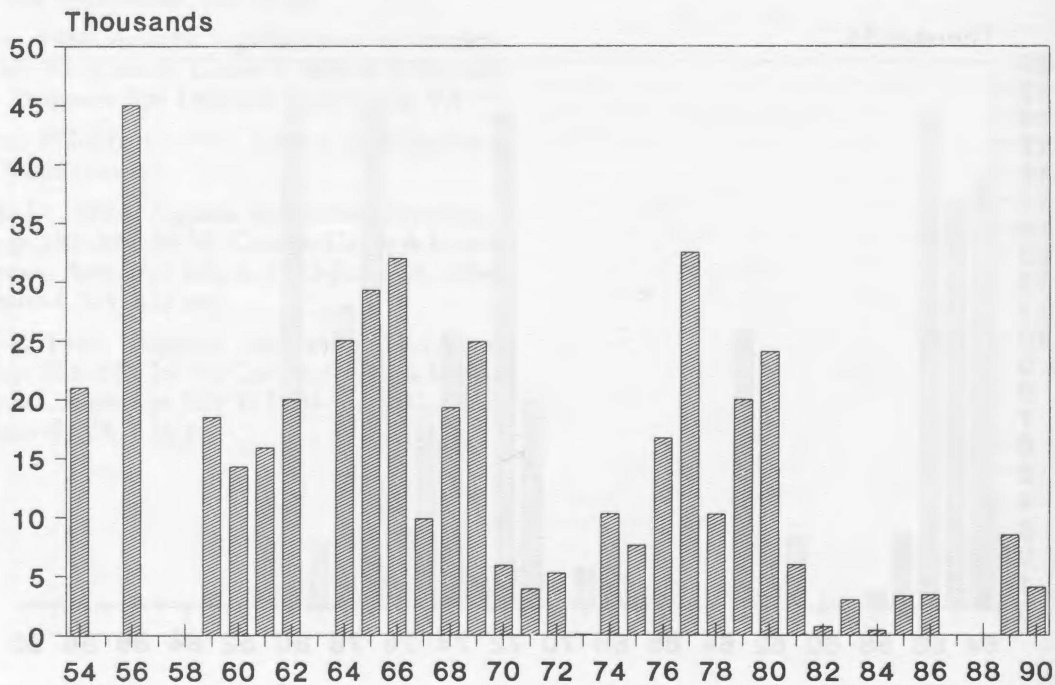


Figure 4. Snow Geese - Back Bay, VA

CANADA GEESE - BACK BAY, VA

Mid-Winter Inventories - 1954-1990

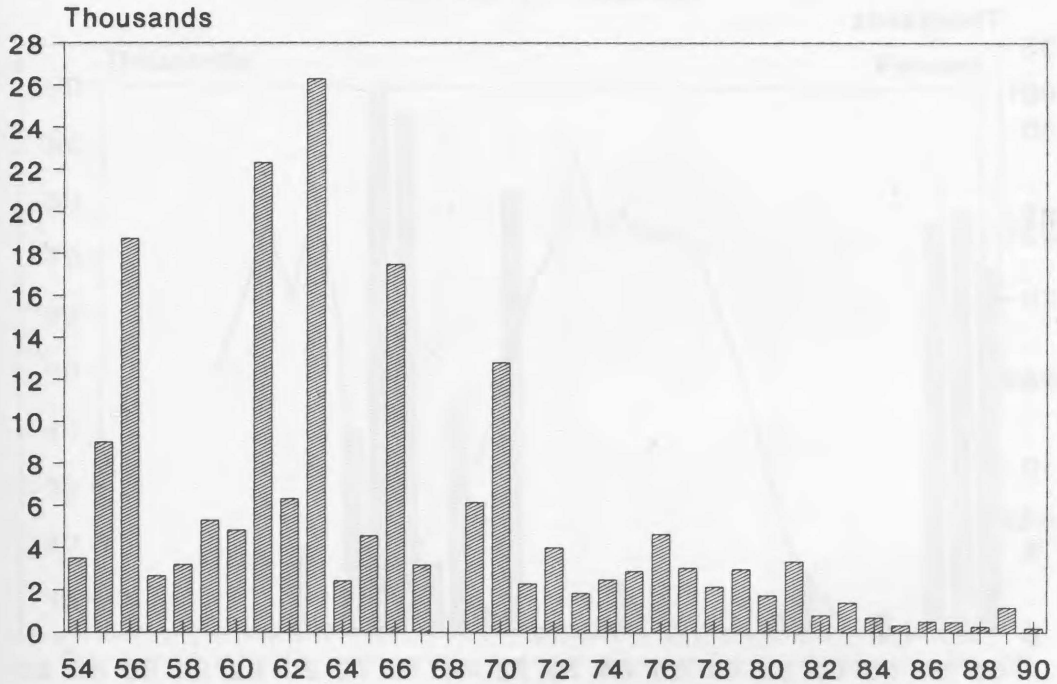


Figure 5. Canada Geese - Back Bay, VA

TUNDRA SWAN - BACK BAY, VA

Mid-Winter Inventories - 1954-1990

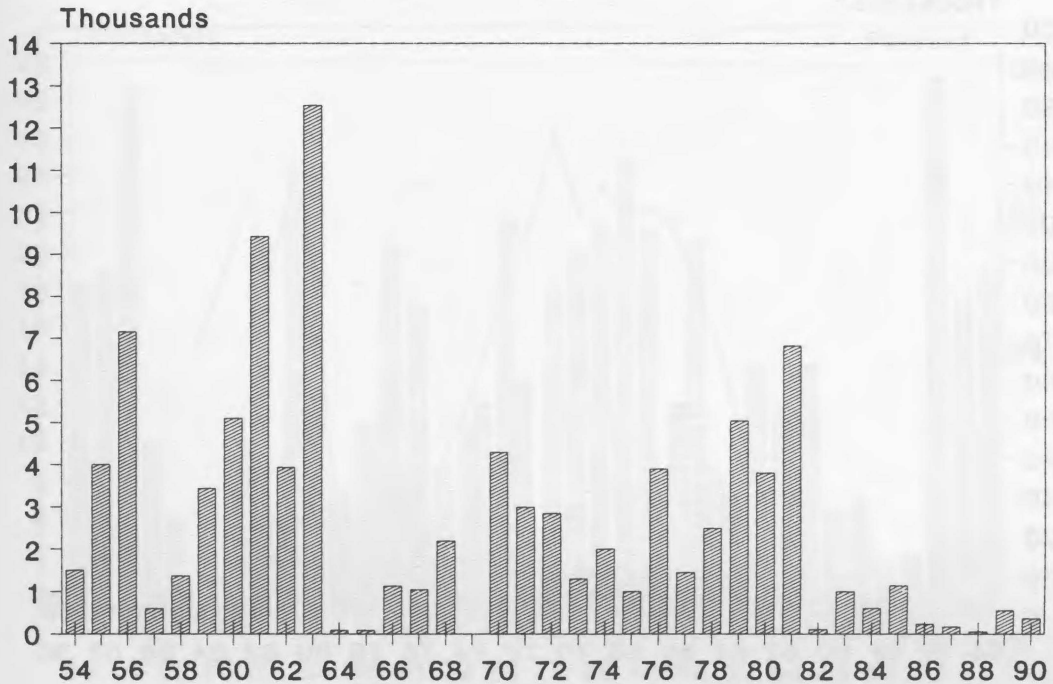


Figure 6. Tundra Swan - Back Bay, VA

COOTS - BACK BAY, VA

Mid-Winter Inventories - 1954-1990

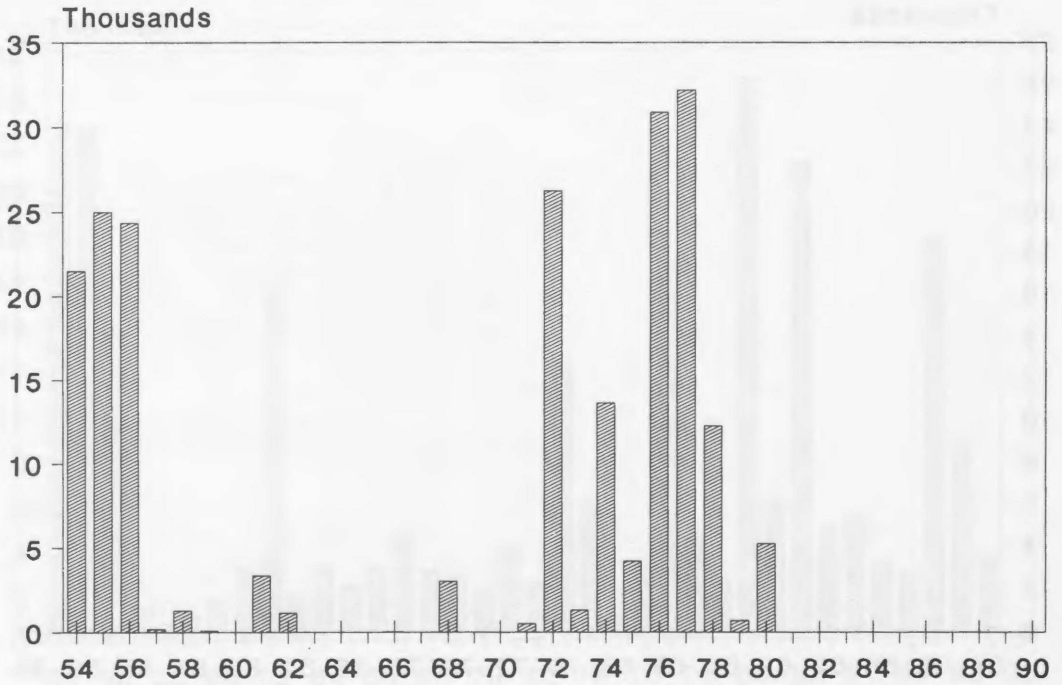


Figure 7. Coots - Back Bay, VA

TOTAL WATERFOWL - BACK BAY, VA

Mid-Winter Inventories - 1954-1990

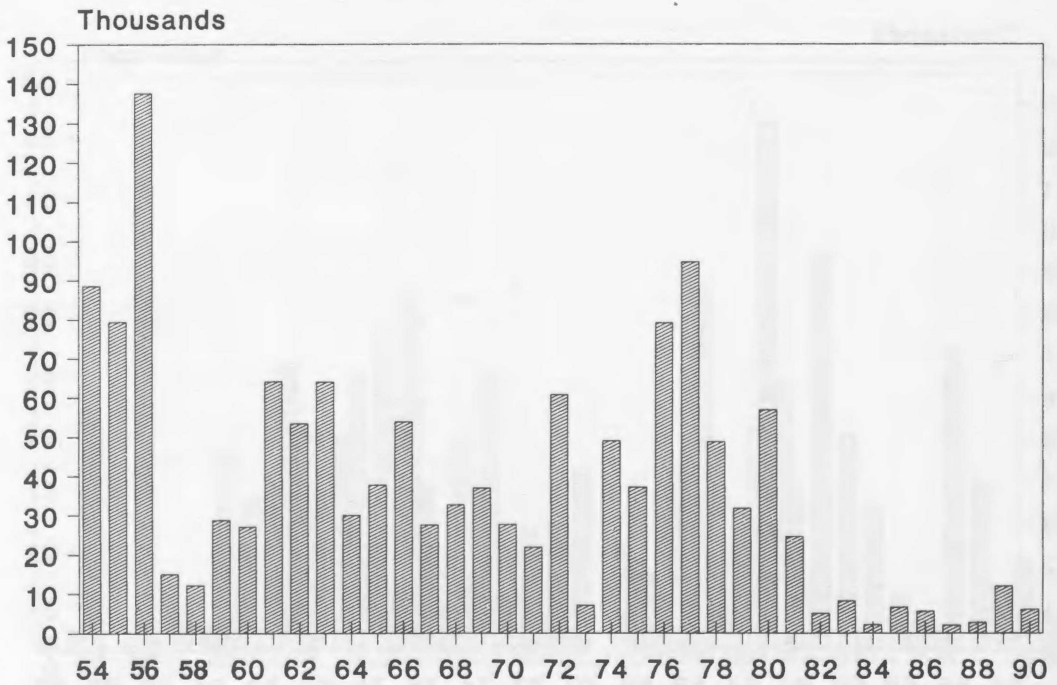


Figure 8. Total Waterfowl - Back Bay, VA

PERCENT FREQUENCY OF SUBMERGED AQUATIC VEGETATION

Back Bay, VA - 1959-1991

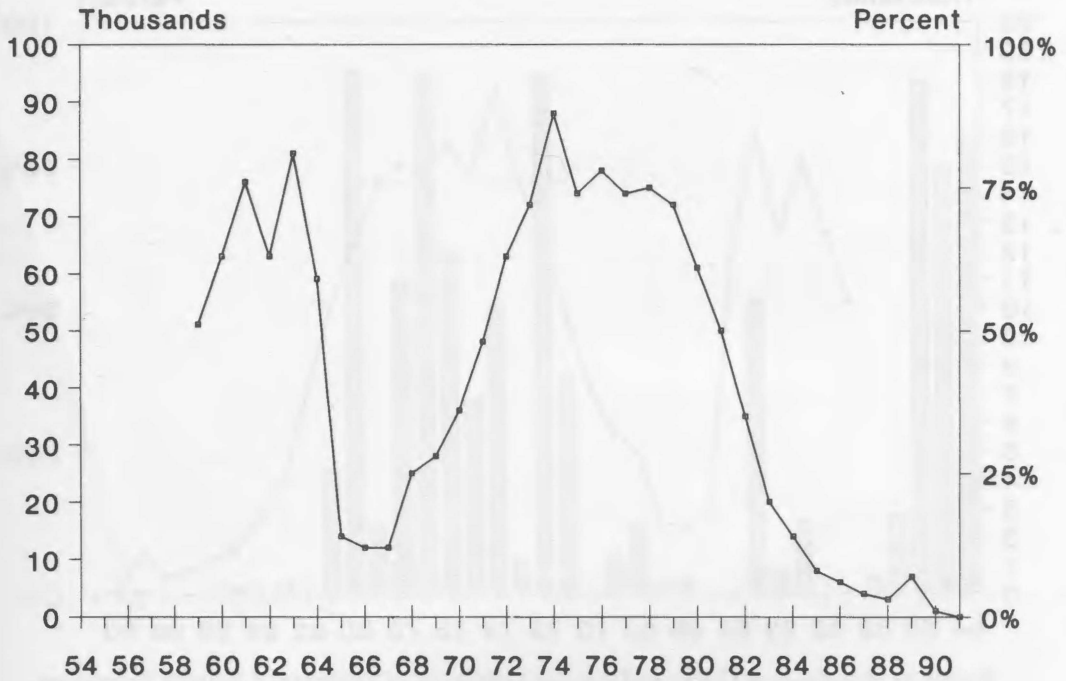


Figure 9. Percent Frequency of Submerged Aquatic Vegetation.

DABBLING DUCKS AND % FREQUENCY OF SUBMERGED AQUATIC VEGETATION

Back Bay, VA - 1954-1991

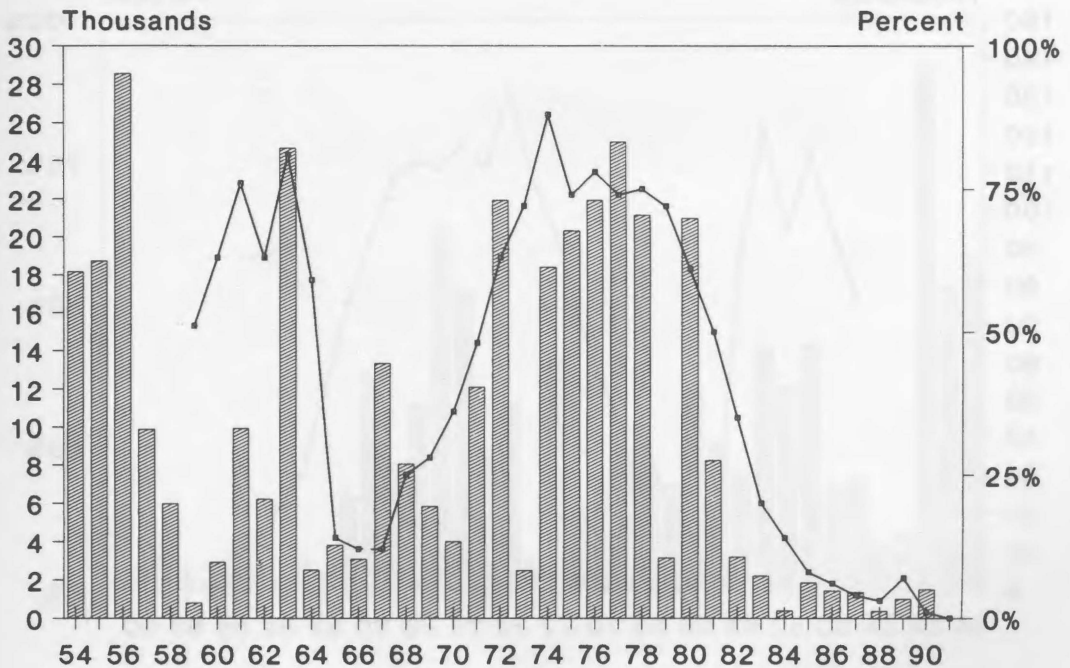


Figure 10. Dabbling Ducks and Percent Frequency of Submerged Aquatic Vegetation.

BAY FEEDING DUCKS AND % FREQUENCY OF SUBMERGED AQUATIC VEGETATION

Back Bay, VA - 1954-1991

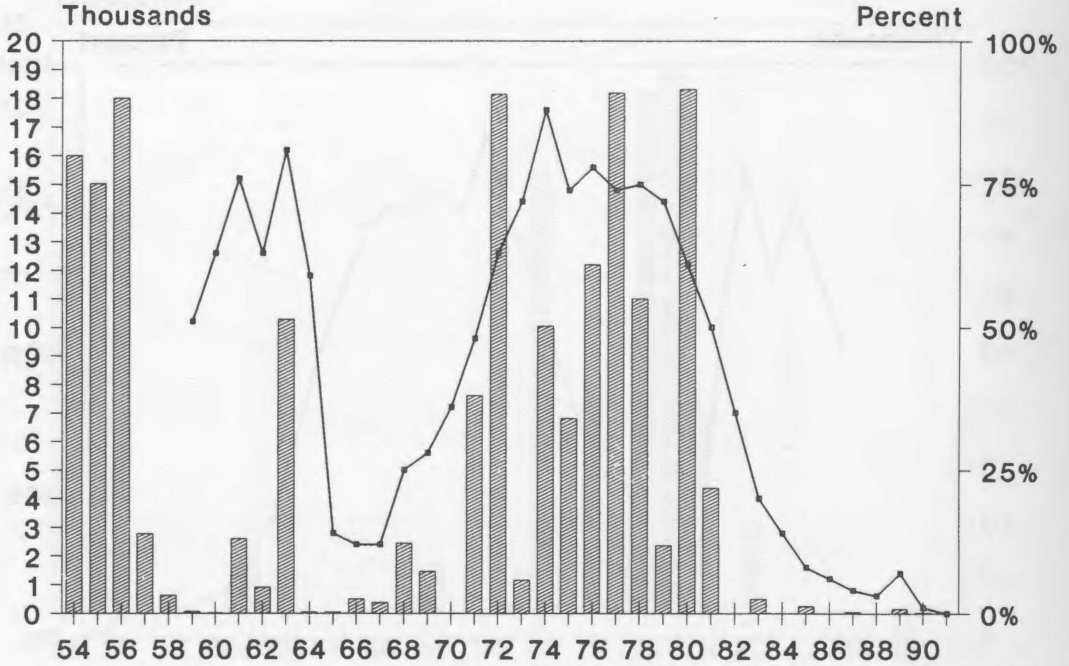


Figure 11. Bay Feeding Ducks and Percent Frequency of Submerged Aquatic Vegetation.

TOTAL WATERFOWL AND % FREQUENCY OF SUBMERGED AQUATIC VEGETATION

Back Bay, VA - 1954-1991

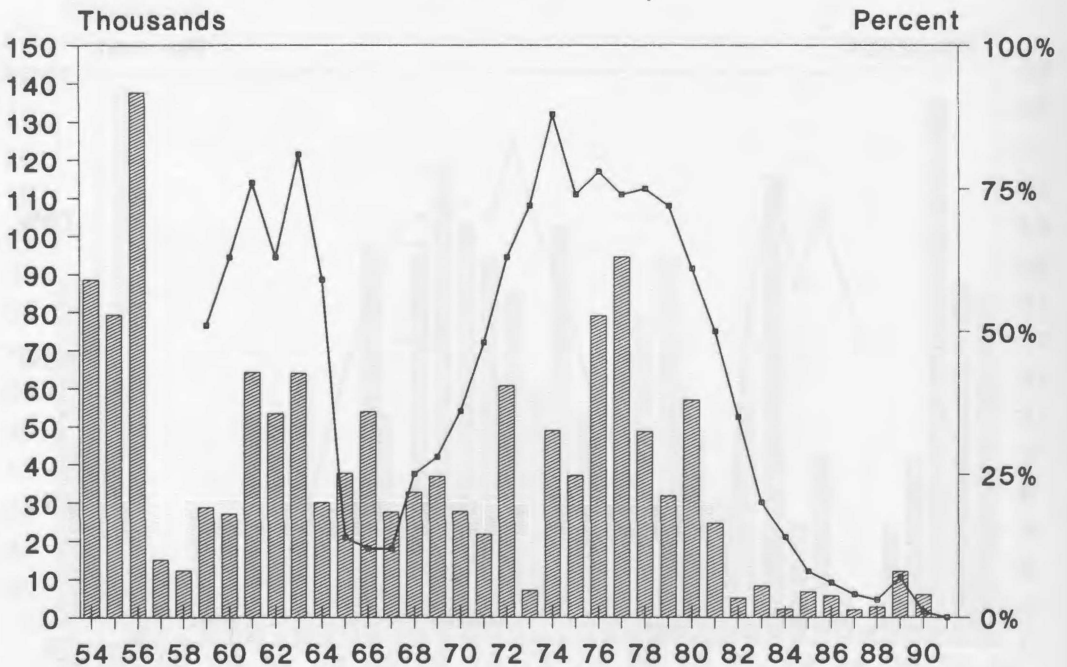


Figure 12. Total Waterfowl and Percent Frequency of Submerged Aquatic Vegetation.