WOODCOCK STATUS REPORT
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ABSTRACT

Information on the current status and population trends of the American woodcock is provided by annual singing-ground surveys over much of the species' breeding range and by wing-collection surveys in the eastern United States. The 1971 singing-ground survey showed declines in the breeding population index of 9.7 percent in the Atlantic Region, 7.2 percent in the Central Region, and 8.3 percent rangewide. These indexes are based upon 901 comparable survey routes, all randomly selected--20 percent more than the 752 routes used in 1970.

The wing-collection survey for the 1970-71 season suggested the greatest 1-year change in productivity in the history of the survey-- a 25 percent increase. Average daily bag per hunter was unchanged from the previous year, while the average season bag showed a slight increase. There is evidence that the woodcock harvest and the number of hunters participating have increased substantially since 1964, with the U.S. harvest in 1970-71 exceeding 1.3 million birds. Woodcock research is increasing, with present emphasis on more banding on breeding grounds. Limited band recoveries to date suggest little interchange between Atlantic Region and Central Region breeding populations.

INTRODUCTION

This report presents data on the American woodcock (<u>Philohela minor</u>) obtained from the singing-ground survey conducted during the spring of 1971, the wing-collection survey conducted during the previous hunting season, and additional information which has accumulated since publication of the 1970 woodcock status report (Clark, 1971).

The woodcock is increasing in popularity as a game bird. Although interest in the species is still greatest in northern States and adjacent Canadian Provinces, more U.S. hunters in the central latitudes and the South are turning to woodcock. Except in the Northeast, most woodcock were formerly taken incidentally to grouse or quail hunting. More hunters now seek woodcock as a primary game species. Factors contributing to this change include:

1. Greater recognition of the woodcock's sporting qualities.
2. Expansion of bird-dog ownership and greater hunter mobility.
3. More liberal daily bag limits and season lengths in recent years.

Members of the rapidly increasing fraternity of birdwatchers also are becoming more cognizant of woodcock. Thus, the importance of the bird is growing in our recreation-conscious society.

Most game managers and researchers have given far less attention to woodcock than to waterfowl and resident game bird species. Although woodcock research and management activities are increasing at both Federal and State-Provincial levels, there are many missing links in the chain of knowledge necessary to understand this species and its potential for supplying outdoor recreation.

SINGING-GROUND SURVEY

Procedures

The singing-ground survey, which enumerates singing males heard along predetermined routes, is used as an index to the size of the breeding population. Analysis of these and other data from intensive research on the breeding grounds should increase our ability to relate singing-ground survey results to actual breeding populations. At present, the index is our sole measure of the woodcock breeding population.

Between 1964 and 1970, the basis of the survey gradually changed from routes selectively located in woodcock habitat of average or better than average quality (management routes) to randomly located routes

covering habitat of all levels of quality (Clark, 1970). Because the conversion from management routes to random routes was 90 percent complete in 1969, the 1970 survey provided comparable random sample data for 2 consecutive years from most of the woodcock's breeding range. Beginning in 1970, comparable breeding population indexes for the breeding range of the woodcock are based entirely upon random routes. In the 1971 survey, 98 percent of the 990 routes checked were randomly selected (table 1). In four States where both management and random routes were surveyed, results from the two types could not be combined.

The 1971 indexes are based on 901 comparable routes, 20 percent more than the previous high of 752 in 1970. Thus, the breeding range was more intensively sampled than ever before. In computing the indexes, data from each State were weighted according to the State's proportion of the total land area (inland water area excluded) in the region or the range of the species (table 2).

Some routes had no singing males at any of the 10 stops. Routes showing "0" results for 2 consecutive years under comparable circumstances are placed on the "Constant 0" list. These are included in the number of comparable routes, but are not field-checked annually; they will be checked at 5-year intervals to determine if woodcock are present. The substantial number of routes converted to "Constant 0" status in 1971 resulted in a decline in routes actually field-checked (table 1).

In past years, singing-ground survey data have been shown for an "Eastern Region" and a "Western Region," but wing-collection survey data were not segregated by regions. In the latest reports, it seemed desirable to examine both wing-collection survey and banding data on a regional basis. To establish regional terminology descriptive for all aspects of woodcock investigations, the terms "Atlantic Region" and "Central Region" are now used in woodcock administrative and status reports. The only boundary change has been placing West Virginia, formerly in the Western region of the singing-ground survey, in the Atlantic Region. Northern recoveries of woodcock banded in West Virginia have been largely in the Atlantic Region, while southern recoveries have been about evenly divided between the Atlantic and Central Regions. Also, from the geographical aspect (fig. 1), it seemed logical to include West Virginia with the Atlantic States rather than with the Central States.

Because the group of routes paired with comparable routes the preceding year to determine percent change is not necessarily the same group paired with comparable routes the subsequent year, it is not logical to depict graphically the actual number of birds heard per route. Also, the conversion to random routes, which usually averaged fewer birds than management routes, precludes portraying
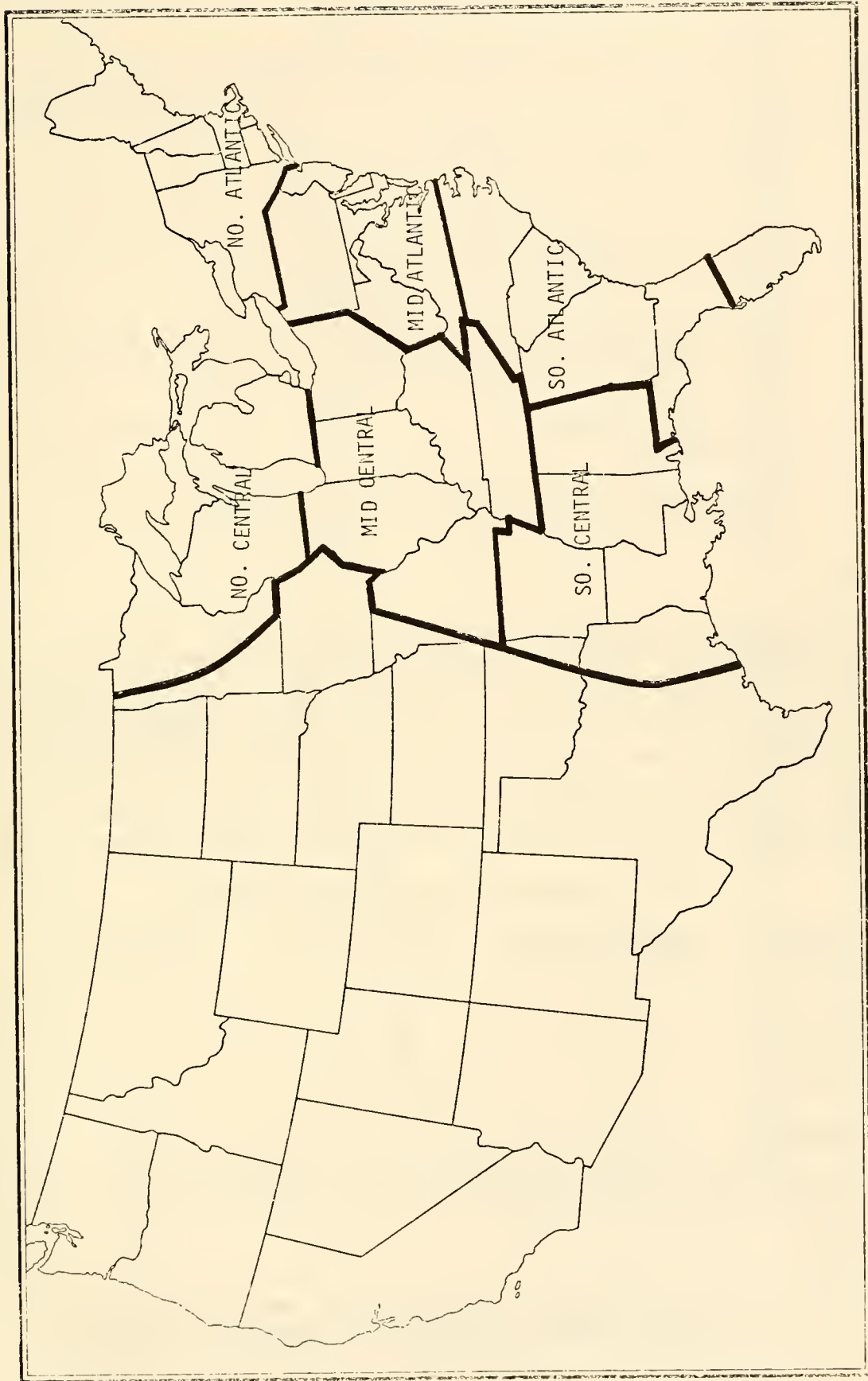
Figure 1.--Reference areas of U.S. woodcock surveys.

the annual average number of birds per route. Therefore, the average number of woodcock heard per comparable route shown in figure 2 is calculated as follows:

1. Determine percent difference (in number of woodcock heard per comparable route) between the 1969 and the 1970 surveys.

2. Apply that percentage to the 1970 average number of woodcock heard per comparable route to obtain an adjusted figure for 1969.

3. Apply the percent difference between 1968 and 1969 (as shown in the 1969 report) to the adjusted 1969 figure to obtain an adjusted figure for 1968.

4. Do the same for each year, working back to the beginning of the index period.

5. Graph the adjusted figures for the index years, rather than the figures actually recorded each of these years.

Results

The 1971 survey showed a 9.72 percent decrease in the number of woodcock heard per comparable route in the Atlantic Region (Atlantic Coast States and Provinces, plus Vermont) and a 7.24 percent decrease in the Central Region (States and Provinces west of the axis of the Allegheny Mountains). When the data were weighted on a rangewide basis, the index showed a decline of 8.34 percent. Following is a summary of the annual changes for the past 7 years, based on data weighted regionally and rangewide. Shifting West Virginia to the Atlantic Region changed the regional results less than 1 percent.

| Year | Percent change from previous year | | |
	Atlantic Region	Central Region	Rangewide
1965	− 0.4	−11.1	− 6.5
1966	+ 2.4	− 0.5	+ 1.7
1967	+ 1.5	− 3.5	0
1968	− 8.4	− 4.5	− 6.9
1969	+ 4.2	+12.1	+ 8.8
1970	0	+ 3.1	+ 2.1
1971	− 9.7	− 7.2	− 8.3
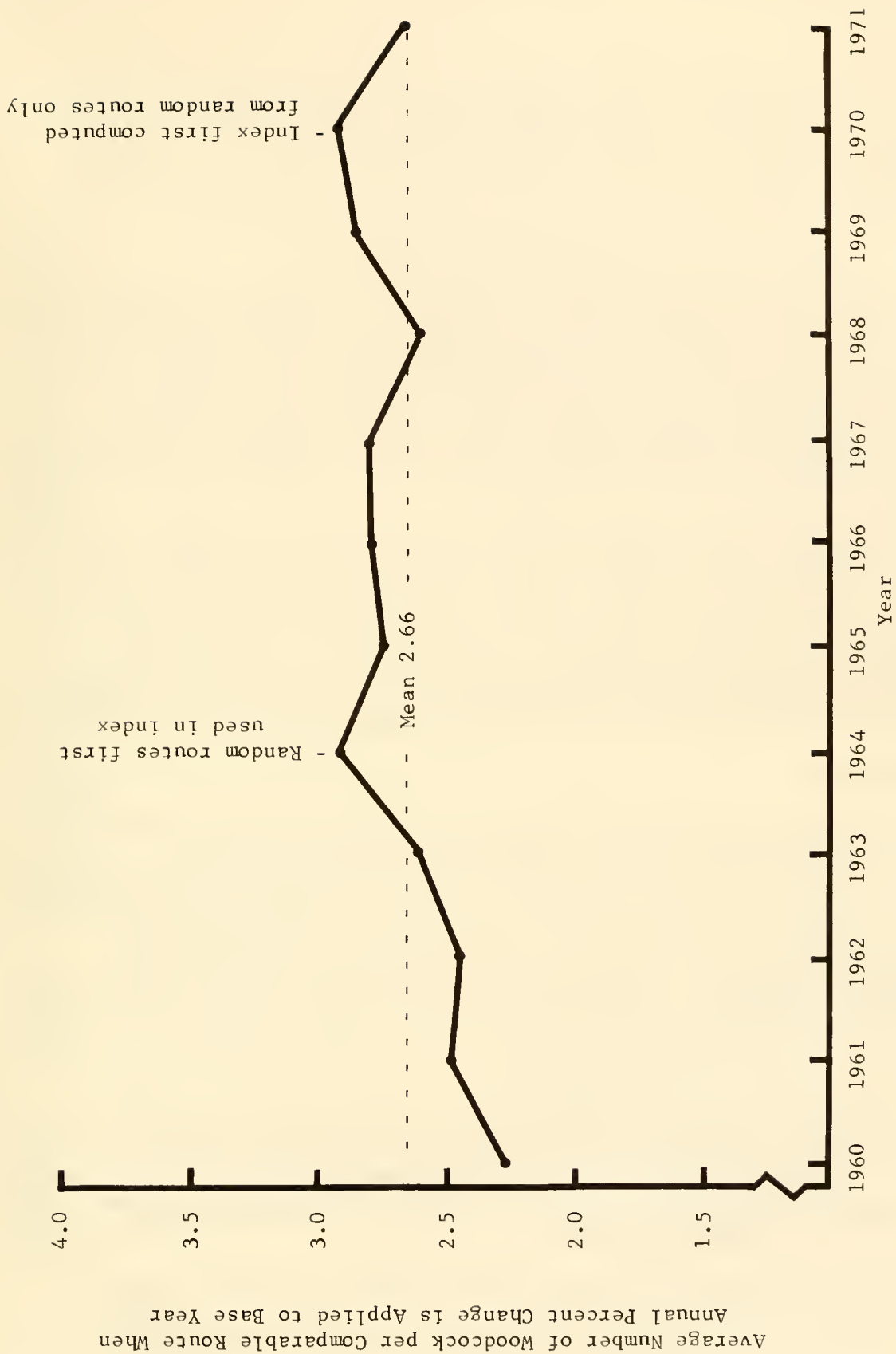
Figure 2.--Trends in singing male woodcock as determined from annual singing-ground surveys
(Base year - 1970)

Year

Average Number of Woodcock per Comparable Route When
Annual Percent Change is Applied to Base Year

Index first computed
from random routes only

Random routes first
used in index

Mean 2.66

4.0 3.5 3.0 2.5 2.0 1.5

1960 1961 1962 1963 1964 1965 1966 1967 1968 1969 1970 1971

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Annual changes in the breeding population index have been generally compensative since 1964 (fig. 2). Prior to that, the trend was upward.

WING-COLLECTION SURVEY

A wing-collection survey was initiated in the United States in 1959 to determine the age and sex composition of the woodcock harvest. The primary objective was to obtain data on reproductive success of the species, but the survey also produces information on changes in geographic and chronologic distribution and size of the harvest. Because serially numbered envelopes are used for each day's bag, it is possible to determine both daily and seasonal hunting success per hunter.

Response to the wing-collection survey has been generally good since its inception in 1959. Annual submissions of wings have ranged from 8,786 the first year to 18,439 in the 1968-69 season, and have averaged 14,084 per season. A number of wings were received from special study areas in addition to those from the regular survey. Because data from them are not comparable in all respects with data from the operational wing survey, they are not included in the general analysis. They will be used in a later report.

Procedures

The procedures for collecting and processing wings and analyzing data were the same as for the 1968-69 season (Clark, 1970).

Because we lack a uniform method for sampling woodcock hunters, it is necessary to use several sources of names and addresses in assembling a mailing list for participants in the wing-collection survey. To facilitate data analysis, each source is given a code number as follows:

Code 1 - Previous years' Code 1, 2, 4, 7, and 8 hunters who submitted wings.

Code 2 - Waterfowl mail survey hunters who reported hunting woodcock.

Code 4 - Hunters who ask to participate or are proposed by a fellow hunter.

Code 7 - Hunters who appear on both Code 1 and Code 9 lists.

Code 8 - Previous years' Code 9 hunters who submitted wings.

Code 9 - Hunters on a list provided by a State from its kill
        survey (except in New Jersey, where list was from
        woodcock hunting stamp purchasers).

The distribution of contacts by States is shown in table 3. A
total of 7,447 hunters was contacted in the 1970-71 woodcock survey,
5 percent less than in 1969-70. The greatest decline occurred in
Code 9 hunters. Hunters who cooperated in previous years (Code 1)
submitted the most wings and were the sole source of comparable data.
Lists of hunters' names and addresses obtained from State kill surveys
(Code 9) probably produce the least biased samples within each State;
however, procedural variations between States introduce new biases.
Also, many States either have no kill survey or do not inquire about
woodcock in their questionnaires. The number of Code 4 names added
annually at the request of survey participants or their friends is
relatively small. The list of woodcock hunters from the Bureau's
waterfowl mail survey (Code 2) is the largest source of names but the
number of wings submitted per contact is very low. A significant bias
in this source is the large State-to-State variation in the ratio of
waterfowl hunters to total hunters. For example, both Louisiana and
Pennsylvania are important woodcock harvest States. However, only one
Pennsylvania hunter in 20 purchases a duck stamp; in Louisiana, one-third
of all hunters purchase duck stamps. It is evident that precise analysis
of a survey sample originating from such varied sources is impossible.
However, it is believed that major changes in woodcock productivity
and in harvest rates can be detected.

Results

The number of wings received increased slightly from 17,940 in
1969-70 to 18,385 in 1970-71. Wing totals vary slightly between
different tables because incomplete information necessitated excluding
a few wings from some tabulations.

A listing by States of the number of cooperators, envelopes, and
wings received for the past three hunting seasons is shown in table 4.
Numbers of envelopes are shown because each envelope represents 1 day's
hunt by one hunter, consequently the bag per successful day.

Comparison of sample source.--The response rate and wings con-
tributed in the three principal categories of hunters are shown in
table 5. Code 1 and Code 9 data overlap slightly because both include
Code 7 data. Weighted averages in this comparison were similar to
those from the 1968-69 and 1969-70 seasons, as indicated in the
following summary:

		Code 1	Code 2	Code 9
Percent response	1968-69	61.1	18.4	13.9
	1969-70	58.6	16.5	14.3
	1970-71	58.8	14.0	13.1
Wings received per contact	1968-69	8.0	0.9	0.7
	1969-70	6.3	0.7	0.7
	1970-71	6.6	0.6	0.8
Wings received per contributor	1968-69	13.2	4.8	4.9
	1969-70	10.8	4.0	5.2
	1970-71	11.3	4.0	6.2

The variability in data from the three principal sample sources is illustrated in table 6. As in the previous season, data from New Jersey Code 9 hunters differ from those of Code 9 hunters in other States. This is because the New Jersey hunters are from lists of purchasers of a special stamp required for woodcock hunting prior to the regular small game season.

Four States provided representative sample hunter lists for the third consecutive year. Data from wings contributed by these hunters, when compared with data provided by other hunters, showed inconsistent results. Additional years' data are needed to clarify the effects of source of hunters' names on survey results. More State lists have been solicited for the 1971-72 season.

Weighting factors.--Because the number of wings received from each State usually was not proportional to the woodcock harvest in that State, it was necessary to weight data used in computing overall productivity and harvest index trends.

Since we lack a uniform sampling frame for woodcock hunters, a completely satisfactory weighting method has not been devised. The crude procedure currently used is based upon a combination of data from the Bureau's waterfowl mail survey, "duck stamp" sales, and State license sales (Clark, 1970). The derivation of weighting factors for computing productivity and harvest indexes for the 1970-71 season is shown in table 7.

Productivity index.--In this report reproductive success is used as a measure of productivity. Woodcock can be aged and sexed by wing plumage characters (Martin, 1964). The ratio of immatures to adult females in the harvest, as determined from the wing-collection survey, provides a measure of reproductive success during the preceding breeding season (table 8). Considerable variation occurs in immature-adult female ratios between different harvest areas (States or Provinces), and between different years for the same harvest areas. These variations

are probably caused by differences in hunting season dates, weather con-
ditions, hunting season restrictions imposed by emergency situations
such as fire hazard, and possibly differential migration coupled with
differential vulnerability to hunting among sex and/or age groups. How-
ever, the annual change in age ratios usually is small when rangewide
data are weighted and combined. The 1970-71 hunting season was an
exception, with the sharpest 1-year change in the age ratio to date--
a 25 percent increase. This reversed the downward trend in productivity
which occurred from 1959 to 1969. When age ratios are graphically
depicted using annual percent change, with 1969-70 as the base year,
the 1969-70 age ratio marks the low point, while the 1970-71 figure is
the high (fig. 3).

It should be understood that variation in the productivity index
due to differences in hunters sampled has been eliminated by using only
data from comparable hunters (hunters who participated in the survey
both years) in computing the change in weighted index (table 9).

Hunter success index.--An appraisal of trends in the woodcock har-
vest--both daily and seasonal success--has been attempted by showing
annual percent change in the number of wings submitted by hunters who
participated in the survey for 2 consecutive years (table 10). Average
daily harvests have changed little from year to year. The trend was
downward from 1963 to 1966, upward from 1966 to 1968, down slightly in
the 1969-70 season, and unchanged in 1970-71.

Seasonal harvest has shown slightly greater annual percent changes
than daily harvest. The general trend has been upward, but there was a
slight decline in the 1968-69 season, a sharper decline of 11.1 percent
in the 1969-70 season, and an insignificant increase of less than 1 per-
cent in the 1970-71 season (fig. 3).

The distribution of daily bag sizes according to wing-collection
data showed little variation between 1969-70 and 1970-71:

|	1969-70		1970-71	
Bag Size	Successful Hunts	Percent of Total	Successful Hunts	Percent of Total
1	2,822	39.7	3,086	40.1
2	1,533	21.6	1,637	21.2
3	1,042	14.7	1,081	14.0
4	733	10.3	842	10.9
5	976	13.7	1,060	13.8
Total Successful Hunts	7,106	100.0	7,708	100.0
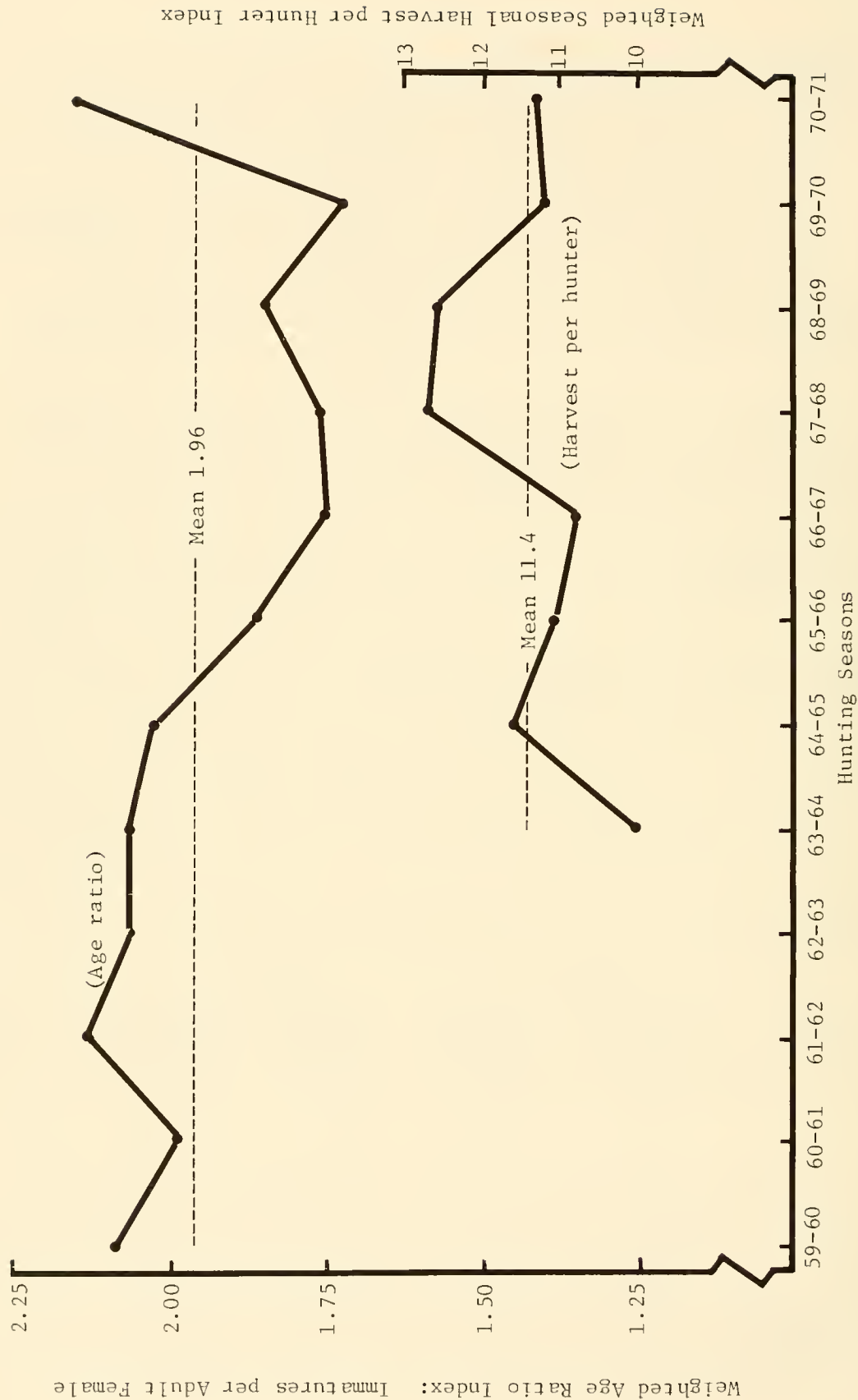
Figure 3.—Weighted age ratio and seasonal harvest per hunter indexes, as determined from annual woodcock wing-collection survey data from comparable hunters (Base year – 1969–70)

Greater variations were evident in regional summaries of the data (table 11). However, annual variations were small when samples totaled over 1,000 hunts.

Hunter success needs further study before hunting pressure can be related to woodcock population trends. A correlation may be revealed by information obtained through a uniform sampling frame such as the proposed Federal migratory upland game bird hunting permit, and from accumulating banding data.

Regional analysis of wing-collection data

Sex and age ratios.--An investigation of factors affecting productivity and hunter success was initiated in 1970. Since differential migration by sex-age groups in correlation with the timing of hunting seasons would materially influence the productivity index, the first step was an analysis of regional sex and age ratios by time periods.

Recent band recovery data suggest that within the woodcock range there may be less intermingling of woodcock from the Central and the Atlantic Regions than was formerly supposed. Thus, data from the two regions were analyzed separately. Within each region, three sub-units were established (fig. 1). The criteria used in selecting these were:

1. Northern sub-unit--States with relatively high density woodcock breeding populations where the harvest consists of a high proportion of locally reared birds.

2. Middle sub-unit--States with moderately low density breeding populations where the harvest consists more of migrant woodcock.

3. Southern sub-unit--States with small breeding populations where the harvest consists primarily of wintering and migrant woodcock.

Naturally, there is overlapping of characteristics between these subregions. Although State boundaries do not accurately delineate the criteria described, they serve our present purposes.

The woodcock harvest, as represented by the wing collection, was divided into 10-day periods for regional comparisons. These minor periods were grouped into three major periods for each subregion. Grouping dates were selected that placed approximately 50 percent of the wings in the middle period and 25 percent each in the first and third periods. If seasonal trends in sex or age ratios occur, the broader separation between early and late season should make them more apparent. Data for the 1968-69, 1969-70, and 1970-71 seasons are summarized for the Central Region in table 12, and for the Atlantic Region in table 13.

In some States the wing sample was adequate for the same comparison as in the subregions. For individual States it was possible to pinpoint the three harvest periods more precisely, except in southern subregions where it was necessary to pool States in principal wintering areas. Data are summarized for two States and a wintering area group in the Central Region (table 14) and the Atlantic Region (table 15). Each table was designed to present the data in a north-to-south manner.

In view of the effect of weather on timing of migration, and subsequently the availability of woodcock for harvest, conclusive results could not be expected from only 3 years' data. Inconsistencies will be noted in sex and age ratios in the tables. However, we believe that accumulating data may reveal enlightening trends.

Timing of harvest.--Distribution of the harvest as shown by 10-day wing-collection periods provides some insight into timing of the fall migration. Inasmuch as substantial numbers of woodcock are produced in Canada, the harvest in even the northern States includes some migrants. It is possible, with a season length of 65 days, to encompass the period of greatest abundance of woodcock within a particular State. In those few States where the most advantageous hunting season for resident game birds is the prime consideration in determining the opening date of the woodcock season, the period of greatest woodcock abundance may be missed in many, if not most, years. A north-to-south distribution of the 1968-69, 1969-70, and 1970-71 harvests is shown for the Central Region (table 16) and Atlantic Region (table 17). Although larger samples are needed for some States, the tables provide some indication of the chronology of fall migration as reflected by birds available for harvest.

No adjustment was made in either table for periods in which the beginning or end of the season occurred, and which encompassed less than 10 days of hunting. Heavier hunting pressure on the opening day or first weekend may partially compensate for a shortened period at the beginning of the season. However, concentration of hunting effort and harvest on the opening day of the season probably is not as great for woodcock as for other game birds.

The wing-collection survey data were summarized by 7-day periods as well as by 10-day periods. Distribution of the harvest by 7-day periods beginning with the opening date in each State provides better information on the timing of harvests in individual States (tables 18 and 19). The shorter period makes regional pooling of data more difficult because it magnifies problems of State-to-State variation in opening dates. However, it eliminates variation in hunting opportunity which occurs with 10-day periods where the first period may cover from 1 to 10 days and some periods include two weekends. The effect of weekend hunting varies materially, depending upon whether or not Sunday hunting is permitted.

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The woodcock hunting season in some northern States may be short-
ened by weather conditions or conflict with the deer hunting season
when use of bird dogs may be undesirable. However, most of those
States still enjoy good woodcock harvests.

Tables 18 and 19 suggest that some States could benefit from
earlier or later seasons than those selected in 1969-70 and 1970-71.
Although results may be biased by inadequate sample size, unduly high
percentages of the harvest in the first 2 weeks suggest that an earlier
season should be selected. Concentration of the harvest toward the end
of the season indicates the need for a later season. States having
small samples in the survey may profit by examining data from other
States, in the same latitude, north, or south, as may be available.

RANGEWIDE HARVEST

No single uniform sampling frame is available for measuring wood-
cock harvest. Since 1964, the Bureau's waterfowl hunter mail survey
has provided data on the woodcock kill by waterfowl hunters. Because
that survey is the only source of data having rangewide comparability,
recent woodcock harvest figures derived from that survey (MacDonald
and Martin, 1971) were examined for trends.

Tables 20, 21, and 22 list (1) number of waterfowl hunters in
States where woodcock are hunted, (2) number of waterfowl hunters who
hunted woodcock, and (3) woodcock harvest by waterfowl hunters. Data
are available for the 7-year period 1964-65 through 1970-71. In view
of the substantial annual variations, the average of the first 2 years
was compared with the average of the last 2 years to show a trend over
a period of 7 years. Although waterfowl hunters in States within the
woodcock's range increased 46.3 percent, waterfowl hunters who hunted
woodcock increased 73.0 percent. A smaller increase in woodcock har-
vested by those hunters (54.5 percent) is not surprising since most
of the additional hunters are novices in the sport.

Only 10 percent of all hunters buy "duck stamps." Therefore, the
Bureau's mail survey of stamp purchasers does not reach all woodcock
hunters. There is no way of determining the exact number of woodcock
hunters excluded from the survey, but a comparison of mail survey data
for certain States with data from State game harvest surveys in those
States offers a basis for an estimate. Table 23 compares results of
the two surveys in Michigan and New York. These States rank highest
in woodcock harvested during the 1964-69 period, and both conduct
good surveys. Also, the percentage of their licensed hunters that hunt
waterfowl is near the average for States in the woodcock range. There-
fore, they provide reasonably representative samples for comparing
the woodcock harvest reported by waterfowl hunters with that reported
in State kill surveys. Unfortunately, this comparison cannot be made
for all States.

Assuming that Michigan and New York results are representative, table 23 shows that, over a period of years, less than 50 percent of the total U.S. woodcock harvest can be attributed to waterfowl hunters. Thus, it appears that a conservative estimate of the U.S. woodcock harvest can be obtained by doubling the woodcock harvest projection from the waterfowl mail survey. This indicates that the total woodcock harvest in the United States during the 1970-71 season was approximately 1,375,000.

Unlike the United States, Canada has a migratory game bird hunting permit which provides a suitable sampling frame for measuring the Canadian woodcock harvest. This survey indicates an increase in the Canadian woodcock kill from approximately 90,000 in 1967-68 to 100,000 in 1968-69 and 116,000 in 1969-70 (Benson, 1968, 1969, 1970).

SUMMARY OF RESEARCH ACTIVITIES

Ohio completed second-year checks of randomly selected woodcock singing-ground survey routes, and additional routes were activated in Illinois. Also, 10 new random survey routes were checked in Quebec. All significant portions of woodcock breeding range will be sampled on randomly selected survey routes when the necessary additional routes in Illinois and Quebec are established.

Emphasis on woodcock research has now shifted to breeding ground banding and to studies of specific problems. Federally funded woodcock projects in progress in the Fiscal Year ending June 30, 1971 are listed in table 24. Banding is a particularly pressing need, and pilot banding projects have begun in several States and Provinces. Since several newly developed techniques are involved, additional training sessions are needed before a comprehensive banding program can be implemented. Many different organizaitons at the Federal and State-Provincial level are involved. While this somewhat complicates coordination of plans for training, it will increase the output of banded woodcock for the limited funds and manpower that each organization can allot to this species. Expansion of banding effort in the 10-year period, 1961-70, is reflected in table 25. The increase, particularly evident in preseason banding, is graphically shown in figure 4.

Comparisons of recovery locations of woodcock banded in the Atlantic Region with those banded in the Central Region (table 26 and fig. 5) add to existing evidence that, except for the shearing effect of the Atlantic coastline, principal woodcock migration routes have north-south orientation. Mixing on the wintering grounds of birds reared in Atlantic and Central Regions is suggested by recoveries of winter-banded birds in the northern parts of both regions. However, 85 percent of the recoveries from winter-banded woodcock were in the region of banding.

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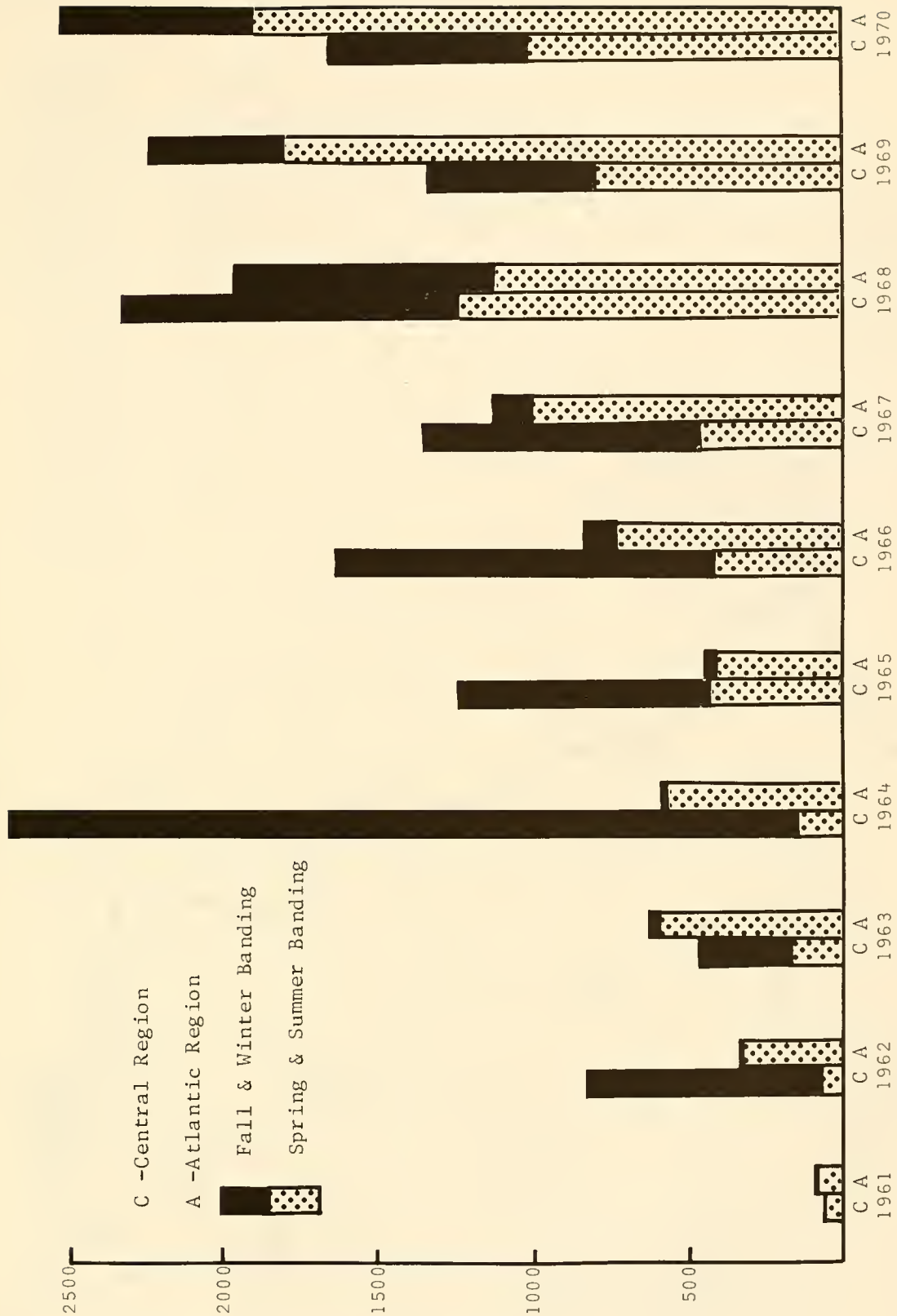
Figure 4.—Woodcock banding by regions, 1961-70 (excluding experimental birds)

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Figure 5.—Woodcock band recoveries from north central and northeast banding (excluding recoveries of banding but including all years and all "How Obtained" codes)

2 – Atlantic Breeding Ground Banding

② – Central Breeding Ground Banding

6

No woodcock banded in the northern part of one region has ever been recovered in the northern part of the other. Two birds banded in Ontario and recovered almost due south in New York and Pennsylvania cannot be considered exceptions to that statement; they demonstrate a weakness of using State and Province boundaries to delineate the regions. The lack of interchange between breeding grounds suggests strong fidelity to natal areas as well as fairly distinct Atlantic and Central breeding populations.

ACKNOWLEDGMENTS

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APPENDIX

Table 1.--Woodcock breeding population indexes as indicated by singing-ground
surveys in 1970 and 1971

State or Province	Number of routes conducted				Comparable routes*	Woodcock heard per comparable route**	
	1970		1971			1970	1971
	Mgmt.	Random	Mgmt.	Random			
ATLANTIC REGION							
Connecticut	13	11	13	10	8 (12)	3.12	2.00
Delaware	--	3	--	3	3	1.33	.33
Maine	--	58	--	58	53	4.83	4.13
Maryland	--	22	--	18	16	1.75	1.69
Massachusetts	--	19	--	15	16	3.25	2.81
New Brunswick	--	44	--	57	26	7.27	5.96
New Hampshire	--	17	--	15	13	5.38	3.46
New Jersey	--	12	--	14	13	1.54	2.38
New York	--	80	--	70	75	2.48	2.99
North Carolina	--	34	--	21	44	.02	.00
Nova Scotia	--	44	--	53	27	1.70	2.19
Pennsylvania	--	57	--	54	62	1.55	1.53
Prince Edward I.	--	11	--	11	6	1.67	4.17
Quebec	--	--	--	10	--	--	--
Rhode Island	--	4	--	3	4	1.00	2.25
Vermont	5	21	3	20	6 (3)	4.17	2.67
Virginia	--	77	--	47	56	.98	.55
West Virginia	--	26	--	23	51	1.02	.75
REGIONAL TOTAL & WEIGHTED AVG. ***	18	540	16	502	479 (15)	2.77	2.50
REGIONAL INDEX CHANGE							-9.72%
CENTRAL REGION							
Illinois	4	12	4	23	9 (4)	.00	.00
Indiana	--	43	--	39	54	.76	.56
Michigan	--	122	--	122	109	4.25	3.99
Minnesota	--	56	--	48	45	1.49	1.53
Ohio	10	82	11	81	65 (7)	1.83	1.62
Ontario	--	65	--	66	45	6.29	5.80
Wisconsin	--	91	--	78	95	2.72	2.52
REGIONAL TOTAL & WEIGHTED AVG. ***	14	471	15	457	422 (11)	3.23	3.00
REGIONAL INDEX CHANGE							-7.24%
RANGEWIDE TOTAL & WEIGHTED AVG. ***	32	1,011	31	959	901 (26)	3.01	2.76
RANGEWIDE INDEX CHANGE							-8.34%

*Includes routes carried as constant zero routes (not actually conducted in
1971) but excludes comparable management routes shown separately in parentheses.
**Figure shown includes only random routes.
***Weighted averages are sums of products of woodcock heard per comparable route
and the corresponding State or Province percentage of the total land area
sampled. States or Provinces excluded where one comparable route represents
more than 2,000 square miles or where birds heard per route is less than 0.50.

Table 2.--Computation of woodcock singing-ground survey weighting factors

Survey Area*	Land Area** (Sq. Mi.)	Comparable Routes	Sq. Mi. per Comp. Rt.	Weighting Factor Regional	Rangewide
ATLANTIC REGION					
Connecticut	4,870	8	609	.0168	.0081
Delaware	1,982	3	661	.0068	.0033
Maine	30,933	53	595	.1068	.0512
Maryland	9,891	16	618	.0341	.0164
Massachusetts	7,833	16	490	.0270	.0130
New Brunswick	27,835	26	1,071	.0961	.0461
New Hampshire	9,033	13	695	.0312	.0150
New Jersey	7,532	13	579	.0260	.0125
New York	47,869	75	638	.1653	.0793
Nova Scotia	20,402	27	756	.0704	.0338
Pennsylvania	45,025	62	726	.1555	.0746
Prince Edward Island	2,184	6	364	.0075	.0036
Rhode Island	1,049	4	262	.0036	.0017
Vermont	9,274	6	1,546	.0320	.0154
Virginia	39,841	56	711	.1376	.0660
West Virginia	24,084	51	472	.0832	.0399
REGIONAL TOTAL	289,637	435	666	.9999	
CENTRAL REGION					
Indiana	36,189	54	670	.1153	.0600
Michigan	56,818	109	521	.1810	.0941
Minnesota	55,655	45	1,237	.1773	.0922
Ohio	41,018	65	631	.1307	.0680
Ontario	69,794	45	1,551	.2223	.1156
Wisconsin	54,464	95	573	.1735	.0902
REGIONAL TOTAL	313,938	413	760	1.0001	
RANGEWIDE TOTAL	603,575	848	712		1.0000

*Excluding States and Provinces where each comparable route represents more than 2,000 square miles or where woodcock heard per comparable route was less than 0.50.

**Land area only (inland water excluded) as listed in 1970 Commercial Atlas and Marketing Guide - Rand-McNally & Co.

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Table 3.--Distribution of contacts and wings received per contact in 1970-71 woodcock wing-collection survey

State of residence	Packets mailed by contact code*						Packets returned	Total hunters contacted	Total wings received**	Wings per contact
	1	2	4	7	8	9				
Ala.	8	34	--	--	--	42	2	82	59	.72
Ark.	5	13	--	--	--	--	--	18	54	3.00
Conn.	137	184	4	--	--	--	2	323	930	2.88
Del.	8	66	2	--	--	--	--	76	40	.53
D.C.	--	1	--	--	--	--	--	1	--	--
Fla.	7	60	--	--	--	9	--	76	26	.34
Ga.	17	60	2	--	--	89	4	164	104	.63
Ill.	9	101	1	--	--	5	--	116	53	.46
Ind.	22	86	5	--	--	--	1	112	111	.99
Iowa	--	7	3	--	--	--	--	10	--	--
Kans.	--	13	--	--	--	--	--	13	--	--
Ky.	1	11	--	--	5	--	--	17	5	.29
La.	47	181	3	--	--	--	4	227	302	1.33
Maine	153	87	9	10	87	536	12	870	3356	3.86
Md.	28	123	13	--	--	132	6	290	215	.74
Mass.	145	231	6	--	22	--	3	401	1488	3.71
Mich.	147	225	13	2	51	544	6	976	2058	2.11
Minn.	33	74	2	--	--	--	3	106	264	2.49
Miss.	6	56	3	--	--	--	1	64	42	.66
Mo.	8	59	2	--	--	14	--	83	42	.51
Nebr.	--	6	--	--	--	--	--	6	--	--
N.H.	68	155	2	--	--	--	2	223	598	2.68
N.J.	171	136	7	25	50	276	7	658	2052	3.12
N.Y.	169	58	11	--	79	--	1	316	1743	5.52
N.C.	17	70	8	--	--	28	1	122	211	1.73
Ohio	63	234	12	--	--	--	3	306	654	2.14
Okla.	--	20	--	--	--	--	--	20	3	.15
Pa.	148	262	8	--	--	--	3	415	1068	2.57
R.I.	26	41	3	--	--	--	--	70	239	3.41
S.C.	15	67	3	--	--	--	--	85	77	.91
S. Dak.	--	2	--	--	--	--	--	2	--	--
Tenn.	26	24	8	--	--	--	--	58	22	.38
Tex.	4	38	2	--	--	--	1	43	16	.37
Vt.	42	59	1	--	--	--	1	101	552	5.46
Va.	16	76	11	--	--	83	2	184	163	.89
W. Va.	13	19	5	--	--	108	5	140	184	1.31
Wis.	148	205	15	2	32	277	6	673	1411	2.10
TOTAL	1707	3144	164	39	326	2143	76	7447	18142	2.44

* Code 1 - Previous years Code 1, 2, 4, and 7 hunters who submitted wings.
  Code 2 - Waterfowl mail survey hunters who reported hunting woodcock.
  Code 4 - Requested participation or proposed by fellow hunter.
  Code 7 - Appeared on both Code 1 and Code 9 lists.
  Code 8 - Previous years Code 9 hunters who submitted wings.
  Code 9 - From list provided by State from its kill survey (except in New Jersey, where list was from woodcock hunting stamp purchasers).
** Excluding wings with incomplete data or from Special Study areas.

Table 4.--Data from woodcock wing-collection surveys conducted during the 1968-69, 1969-70, and 1970-71 hunting seasons

State of residence	Number of cooperators			Number of envelopes			Number of wings			Avg. no. of wings per envelope			Avg. no. of wings per cooperator		
	68-69	69-70	70-71	68-69	69-70	70-71	68-69	69-70	70-71	68-69	69-70	70-71	68-69	69-70	70-71
Ala.	8	8	14	23	24	33	48	36	59	2.1	1.5	1.8	6	5	4
Ark.	5	5	6	10	29	31	14	43	54	1.4	1.5	1.7	3	9	9
Conn.	130	137	127	419	476	439	931	1,062	930	2.2	2.2	2.1	7	8	7
Del.	9	8	10	22	15	28	36	17	40	1.6	1.1	1.4	4	2	4
Fla.	5	7	3	11	18	13	16	26	26	1.5	1.4	2.0	3	4	9
Ga.	20	17	38	40	27	64	50	42	104	1.3	1.6	1.6	3	2	3
Ill.	9	7	12	43	35	30	99	69	53	2.3	2.0	1.8	11	10	4
Ind.	26	21	22	79	76	63	198	178	111	2.5	2.3	1.8	8	8	5
Ky.	2	5	4	2	7	4	2	7	5	1.0	1.0	1.2	1	1	1
La.	32	47	34	157	223	128	444	678	302	2.8	3.0	2.4	14	14	9
Maine	253	247	262	1,049	1,117	1,257	2,941	2,957	3,356	2.8	2.6	2.7	12	12	13
Md.	9	28	40	57	71	108	149	169	215	2.6	2.4	2.0	17	6	5
Mass.	128	166	139	557	733	611	1,573	1,813	1,488	2.8	2.5	2.4	12	11	11
Mich.	195	199	203	716	641	827	1,768	1,524	2,058	2.5	2.4	2.5	9	8	10
Minn.	35	31	30	113	114	98	279	330	264	2.5	2.9	2.7	8	11	9
Miss.	10	6	10	29	18	25	68	36	42	2.3	2.0	1.7	7	6	4
Mo.	5	7	9	7	11	19	13	15	42	1.9	1.4	2.2	3	2	5
N.H.	80	68	55	353	271	265	855	598	598	2.4	2.2	2.3	11	9	11
N.J.	273	245	222	1,032	1,062	904	2,622	2,561	2,052	2.5	2.4	2.3	10	10	9
N.Y.	236	244	160	800	853	728	1,976	2,006	1,743	2.5	2.4	2.4	8	8	11
N.C.	24	17	30	55	34	90	80	62	211	1.5	1.8	2.3	3	4	7
Ohio	71	60	75	251	202	247	648	510	654	2.6	2.5	2.6	9	9	9
Okla.	--	--	2	--	--	3	--	--	3	--	--	1.0	--	--	2
Pa.	157	144	150	556	434	467	1,381	977	1,068	2.5	2.3	2.3	9	7	7
R.I.	25	26	26	85	100	97	216	238	239	2.5	2.4	2.5	9	9	9
S.C.	11	15	17	24	32	43	55	64	77	2.3	2.0	1.8	5	4	5
Tenn.	1	29	14	2	34	18	2	53	22	1.0	1.6	1.2	2	2	2
Tex.	5	4	7	20	23	14	43	95	16	2.2	4.1	1.1	9	24	2
Vt.	47	41	41	242	171	225	545	323	552	2.3	1.9	2.5	12	8	13
Va.	14	16	28	25	48	81	45	105	163	1.8	2.2	2.0	3	7	6
W. Va.	15	13	26	41	52	83	99	136	184	2.4	2.6	2.2	7	10	7
Wis.	164	169	180	465	495	614	1,047	1,003	1,411	2.3	2.0	2.3	6	6	8
Other	--	--	--	--	--	--	196	230	243	--	--	--	--	--	--
TOTAL	2,004	2,020	1,996	7,285	7,436	7,657	18,439	17,940	18,385	2.5*	2.4*	2.4*	9.1*	8.8*	9.2*

*Unweighted mean (includes data from all States, but excludes information from the special study areas and Canadian Provinces).

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Table 5.—Comparison of hunters and rate of wings received for principal code categories, 1970-71 season

State of Residence	No. of Contacts Contact Code 1	2	9	No. Responding Contact Code 1	2	9	No. of Wings Contact Code 1	2	9	% Responding Contact Code 1	2	9	Wings/Contact Contact Code 1	2	9	Wings/Contributor Contact Code 1	2	9
Ala.	8	32	42	3	3	6	31	5	18	38	9	14	3.9	0.2	0.4	10.3	1.7	3.0
Ark.	5	13		3	1		17	29		60	8		3.4	2.2		5.7	29.0	
Conn.	136	183		83	32		648	142		61	17		4.8	0.8		7.8	4.4	
Del.	8	66		2	6		7	25		25	9		0.9	0.4		3.5	4.2	
Fla.	7	60	9	1	2	1	21	1	4	14	3	11	3.0	T	0.4	21.0	0.5*	4.0
Ga.	16	60	86	6	12	17	13	22	61	38	20	20	0.8	0.4	0.7	2.2	1.8	3.6
Ill.	9	101	5	1	3	0	2	3	0	11	3	0	0.2	T	0	2.0	1.0	--
Ind.	22	85		9	6		39	15		41	7		1.8	0.2		4.3	2.5	
Iowa	--	7		--	1		--	0		--	14		--	0		--	0*	
Kans.	--	13		--	0		--	--		--	0		--	0		--	0	
Ky.	1	11		0	2		--	3		0	18		0	0.3		--	1.5	
La.	47	177		25	7		222	38		53	4		4.7	0.2		8.9	5.4	
Maine	162	86	536	110	22	97	2013	125	828	68	26	18	12.4	1.5	1.5	18.3	5.7	8.5
Md.	28	119	130	12	11	8	120	30	21	43	9	6	4.3	0.3	0.2	10.0	2.7	2.6
Mass.	144	229		67	33		585	110		47	14		4.1	0.5		8.7	3.3	
Mich.	149	223	542	91	34	49	1387	204	243	61	15	9	9.3	0.9	0.5	15.2	6.0	5.0
Minn.	31	73		17	12		170	17		55	16		5.5	0.2		10.0	1.4	
Miss.	6	55		4	5		13	21		67	9		2.2	0.4		3.3	4.2	
Mo.	8	59	14	2	4	0	13	5	0	25	7		1.6	0.1	0	6.5	1.3	0
Nebr.	--	6		--	0		--	--		--	0		--	0		--	--	
N.H.	68	153		32	19		484	85		47	12		7.1	0.6		15.1	4.5	
N.J.	196	134	296	125	12	61	1221	54	352	64	9	21	6.2	0.4	1.2	9.8	4.5	5.8
N.Y.	168	58		111	9		1485	19		66	16		8.8	0.3		13.4	2.1	
N.C.	17	69	28	6	8	12	15	44	95	35	12	43	0.9	0.6	3.4	2.5	5.5	7.9
Ohio	62	232		38	22		315	109		61	9		5.1	0.5		8.3	5.0	
Okla.	--	20		--	2		--	3		--	10		--	0.2		--	1.5	
Pa.	147	260		95	55		783	233		65	21		5.3	0.9		8.2	4.2	
R.I.	26	41		13	4		59	6		50	10		2.3	0.1		4.5	1.5	
S.C.	15	67		7	7		29	35		47	10		1.9	0.5		4.1	5.0	
S. Dak.	--	2		--	0		--	--		--	0		--	0		--	--	
Tenn.	26	24		9	1		12	1		35	4		0.5	T		1.3	1.0	
Tex.	4	37		2	4		6	7		50	11		1.5	0.2		3.0	1.8	
Vt.	41	59		31	9		480	35		76	15		11.7	0.6		15.5	3.9	
Va.	16	76	81	8	9	5	51	18	17	50	12	6	3.2	0.2	0.2	6.4	2.0	3.4
W. Va.	12	19	104	10	2	7	91	2	44	83	11	7	7.6	0.1	0.4	9.1	1.0	6.3
Wis.	150	203	275	82	43	38	936	146	135	55	21	14	6.2	0.7	0.5	11.4	3.4	3.6
TOTAL and Wtd. Avg.	1735	3112	2148	1005	402	301	11268	1592	1818	59	14	13	6.6	0.6	0.8	11.3	4.0	6.2

*One respondent contributed snipe wing.

Table 6.--Comparison of Code 9* data with those from other codes in four States, 1970-71 season

	Maine	Michigan	New Jersey	Wisconsin
Hunter Contacts				
State Total**	861	963	651	658
Code 9*	536	542	296	275
Code 9 Percent of Total	62.3	56.3	45.5	41.8
Wings Submitted				
State Total**	3,286	1,879	1,582	1,293
Code 9*	828	243	352	135
Code 9 Percent of Total	25.2	12.9	22.2	10.4
First Week of Season Wings*				
Code 1*				
Number	360	237	106	50
Percent of Season Total	17.9	17.1	8.7	5.3
Code 2*				
Number	23	63	3	12
Percent of Season Total	18.4	30.9	5.6	8.2
Code 9*				
Number	194	42	27	22
Percent of Season Total	23.4	17.3	7.6	16.3
State Total**				
Number	631	364	146	91
Percent of Season Total	19.2	19.3	9.2	7.0
Immatures/Adult Female Ratio				
Code 1*				
Immatures	1,072	853	723	458
Imm./Ad. Female	2.09	2.39	2.63	1.72
Code 2*				
Immatures	77	84	28	70
Imm./Ad. Female	2.96	1.56	2.15	1.75
Code 9*				
Immatures	419	135	203	74
Imm./Ad. Female	1.96	1.71	2.36	2.11
State Total**				
Immatures	1,751	1,094	924	633
Imm./Ad. Female	2.10	2.17	2.52	1.75

*Code 1 - Submitted wings the previous year (excluding Code 9 hunters of previous year).

Code 2 - Hunters on waterfowl mail survey who reported hunting woodcock.

Code 9 - From list provided by State from its kill survey (except New Jersey, where list was from woodcock hunting stamp purchasers).

(Note: Code 7 figures are included with both Code 1 and Code 9 results).

**Excluding Code 4.

***Six days in Maine and New Jersey (Sunday hunting prohibited); 7 days in Michigan and Wisconsin.

Table 7.—Derivation of weighting factors for the 1970-71 woodcock wing-collection survey

	A	B	C	D	E	F	G	H	J	K	L	M
	Hunting License Holders		Duck Stamp Sales		Woodcock Kill by Duck Stamp Purchasers		License Holders to Stamp Sales Ratio			Percent of Mean	State Kill Index	State Weight Factor
STATE*	1968-69	1969-70	1968-69	1969-70	1968-69	1969-70	1968-69	1969-70	Mean			
Conn.	73,722	77,488	12,005	12,889	15,746	19,531	6.1409	6.0119	6.0764	61.08	10,772	.0279
La.	322,076	337,641	90,278	105,274	77,347	111,991	3.5676	3.2072	3.3874	34.05	32,225	.0834
Maine	205,560	202,766	14,696	15,939	38,041	26,786	13.9875	12.7214	13.3544	134.23	43,504	.1125
Mass.	140,896	118,518	23,758	25,630	29,901	33,489	5.9305	4.6242	5.2773	53.04	16,811	.0435
Mich.	918,175	941,025	88,742	101,562	43,125	56,678	10.3466	9.2655	9.8060	98.56	49,183	.1272
Minn.	455,660	356,607	140,934	144,562	8,115	13,840	3.2331	2.4667	2.8500	28.65	3,144	.0081
N.H.	95,767	98,887	7,656	8,938	15,489	13,599	12.5088	11.0637	11.7862	118.47	17,229	.0446
N.J.	181,407	184,527	30,384	32,974	25,249	29,812	5.9705	5.5965	5.7835	58.13	16,003	.0414
N.Y.	725,305	758,512	86,492	98,403	78,166	86,501	8.3858	7.7082	8.0470	80.88	66,591	.1722
Ohio	501,537	540,718	28,911	35,841	15,756	20,300	17.3476	15.0866	16.2171	163.00	29,386	.0760
Pa.	1,102,749	1,134,316	58,055	67,224	31,867	44,641	18.9949	16.8737	17.9343	180.26	68,957	.1784
Vt.	144,570	138,378	5,884	6,317	4,558	5,393	24.5700	21.9056	23.2378	233.57	11,621	.0301
Wis.	631,875	629,445	105,114	122,291	28,506	47,092	6.0113	5.1471	5.5792	56.08	21,194	.0548

*Thirteen States having substantial woodcock harvests and being adequately represented in wing-collection survey.

$$\frac{A}{C} = G \qquad \frac{B}{D} = H \qquad \frac{G+H}{2} = J \qquad \frac{J}{\frac{\Sigma J}{13}} = K \qquad K\left(\frac{E+F}{2}\right) = L \qquad \frac{L}{\Sigma L} = M$$

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Table 8.—Woodcock productivity by harvest area as indicated by the wing-collection survey; 1970-71 hunting season

State or Province of harvest	Age and Sex Categories							Total wings received*	Immatures per adult female**
	ADULT			IMMATURE			Unknown age		
	male	female	unknown	male	female	unknown			
Ala.	7	14	1	19	10	1	3	55	2.14
Ark.	18	22	--	6	8	--	2	56	.64
Conn.	134	140	2	275	272	6	12	841	3.95
Del.	5	3	--	14	10	--	1	33	8.00
Fla.	5	6	--	13	6	--	1	31	3.17
Ga.	19	24	--	45	19	--	2	109	2.67
Ill.	1	3	--	--	1	--	--	5	.33
Ind.	9	16	--	19	17	--	2	63	2.25
Ky.	2	--	--	2	1	--	--	5	N/A
La.	44	67	--	108	109	1	9	338	3.25
Maine	698	945	24	1,073	949	24	80	3,793	2.17
Md.	25	49	--	50	51	1	3	179	2.08
Mass.	114	200	6	211	223	3	12	769	2.19
Mich.	290	607	12	603	691	4	37	2,244	2.14
Minn.	53	86	--	60	67	1	3	270	1.49
Miss.	10	7	--	13	13	--	3	43	3.71
Mo.	3	3	--	10	2	--	14	32	4.00
N.H.	210	359	9	272	315	9	28	1,202	1.66
N.J.	259	387	10	463	482	15	38	1,654	2.48
N.Y.	222	474	5	635	703	11	24	2,074	2.85
N.C.	46	48	--	79	40	1	2	216	2.50
N.S.	--	1	--	3	2	--	--	6	5.00
Ohio	72	134	6	116	112	3	6	449	1.72
Okla.	2	2	--	--	--	--	--	4	.00
Pa.	208	348	1	248	289	8	34	1,136	1.57
R.I.	10	9	--	20	27	--	1	67	5.22
S.C.	20	21	--	23	20	--	--	84	2.05
Tenn.	4	5	--	9	4	--	--	22	2.60
Tex.	4	2	--	5	10	--	1	22	7.50
Vt.	136	177	2	168	132	4	17	636	1.72
Va.	21	14	--	74	62	1	1	173	9.79
W. Va.	29	50	1	45	31	--	3	159	1.52
Wis.	281	421	20	388	345	15	47	1,517	1.78
TOTAL	2,961	4,644	99	5,069	5,023	108	383	18,287	2.20

*Excluding wings from special study areas and unknown harvest areas.

**Unweighted data from harvest areas represented by at least 100 wings.

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Table 9.--Indexes of woodcock productivity as indicated by age ratios determined from wings received from cooperators who participated in both 1969-70 and 1970-71 wing-collection surveys

State of harvest	Proportion of "total" kill (Weighting factor)	Number of wings received		Adult Females		Immatures		Immatures per adult female*	
		1969-70	1970-71	1969-70	1970-71	1969-70	1970-71	1969-70	1970-71
Ala.		27	31	10	7	12	17	1.20	2.43
Ark.		37	21	12	8	17	4	1.42	.50
Conn.**	.0279	691	689	160	117	387	457	2.42	3.91
Del.		2	7	--	--	2	5	N/A	N/A
Fla.		9	21	1	4	7	14	7.00	3.50
Ga.		16	13	5	5	5	6	1.00	1.20
Ill.		12	2	--	1	9	--	N/A	.00
Ind.		69	39	13	6	36	26	2.77	4.33
Ky.		2	1	--	--	2	--	N/A	N/A
La.**	.0834	518	229	91	45	345	147	3.79	3.27
Maine**	.1125	2,573	2,872	728	716	1,215	1,561	1.67	2.18
Md.		90	116	29	37	49	67	1.69	1.81
Mass.**	.0435	785	618	198	160	400	359	2.02	2.24
Mich.**	.1272	1,381	1,704	481	460	590	1,015	1.23	2.21
Minn.**	.0081	220	185	48	56	127	83	2.65	1.48
Miss.		29	13	11	1	10	8	.91	8.00
Mo.		2	13	1	1	1	9	1.00	9.00
N.H.**	.0446	804	1,036	258	308	369	520	1.43	1.69
N.J.**	.0414	1,687	1,374	358	306	1,025	813	2.86	2.66
N.Y.**	.1722	1,770	1,885	555	431	780	1,235	1.41	2.87
N.C.		24	7	2	2	21	4	10.50	2.00
Ohio**	.0760	323	301	89	93	145	151	1.63	1.62
Okla.		1	1	--	--	--	--	N/A	N/A
Pa.**	.1784	833	847	235	260	346	411	1.47	1.58
R.I.		38	52	7	7	26	35	3.71	5.00
S.C.		55	40	15	10	34	18	2.27	1.80
Tenn.		19	12	9	2	4	7	.44	3.50
Tex.		3	6	1	2	1	3	1.00	1.50
Vt.**	.0301	332	555	94	161	155	263	1.65	1.63
Va.		81	66	11	7	51	52	4.64	7.43
W. Va.		77	105	23	30	30	50	1.30	1.67
Wis.**	.0548	906	1,115	263	314	472	542	1.79	1.73
TOTAL AND WEIGHTED AGE RATIO **		13,416	13,976	3,708	3,557	6,673	7,882	1.80**	2.25**
CHANGE IN WEIGHTED AGE RATIOS									+25.00%

*Computed only for harvest areas (States) represented by at least 150 wings in the 2 years.
**Weighted age ratios are the sum of the products of State age ratios multiplied by their specific weighting factors.

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Table 10—Indexes of woodcock hunting success as indicated by the number of wings received from cooperators who participated in both 1969-70 and 1970-71 wing-collection surveys

State of residence	Weighting factor	Number who cooperated both years	Number of envelopes		Number of wings		Average number of wings per envelope*		Average number of wings per cooperator*	
			1969-70	1970-71	1969-70	1970-71	1969-70	1970-71	1969-70	1970-71
Ala.		3	17	13	27	31	1.6	2.4	9.0	10.3
Ark.		3	23	12	36	17	1.6	1.4	12.0	5.7
Conn.**	.0279	81	305	297	682	643	2.2	2.2	8.4	7.9
Del.		2	2	5	2	7	1.0	1.4	1.0	3.5
Fla.		1	8	10	9	21	1.1	2.1	9.0	21.0
Ga.		6	12	12	16	13	1.3	1.1	2.7	2.2
Ill.		1	6	2	12	2	2.0	1.0	12.0	2.0
Ind.		8	27	25	67	39	2.5	1.6	8.4	4.9
Ky.		1	2	1	2	1	1.0	1.0	2.0	1.0
La.**	.0834	24	165	92	509	220	3.1	2.4	21.2	9.2
Maine**	.1125	143	817	871	2217	2541	2.7	2.9	15.5	17.8
Md.		11	39	48	90	116	2.3	2.4	8.2	10.5
Mass.**	.0435	71	313	280	756	600	2.4	2.1	10.6	8.5
Mich.**	.1272	108	463	558	1170	1442	2.5	2.6	10.8	13.4
Minn.**	.0081	16	74	63	214	168	2.9	2.7	13.4	10.5
Miss.		4	15	8	29	13	1.9	1.6	7.3	3.3
Mo.		2	2	5	2	13	1.0	2.6	1.0	6.5
N.H.**	.0446	32	174	199	368	484	2.1	2.4	11.5	15.1
N.J.**	.0414	139	657	576	1598	1326	2.4	2.3	11.5	9.5
N.Y.**	.1722	141	606	665	1516	1596	2.5	2.4	10.8	11.3
N.C.		5	13	6	24	7	1.8	1.2	4.8	1.4
Ohio**	.0760	37	133	115	323	301	2.4	2.6	8.7	8.1
Pa.**	.1784	90	290	309	684	759	2.4	2.5	7.6	8.4
R.I.		10	21	24	38	52	1.8	2.2	3.8	5.2
S.C.		7	17	19	41	29	2.4	1.5	5.9	4.1
Tenn.		8	13	11	18	12	1.4	1.1	2.3	1.5
Tex.		2	2	6	3	6	1.5	1.0	1.5	3.0
Vt.**	.0301	31	144	195	276	480	1.9	2.5	8.9	15.5
Va.		7	30	24	78	50	2.6	2.1	11.1	7.1
W. Va.		10	30	39	73	91	2.4	2.3	7.3	9.1
Wis.**	.0548	89	379	403	819	1005	2.2	2.5	9.2	11.3
TOTAL AND WEIGHTED AVERAGE **		1093	4799	4893	11699	12085	2.5**	2.5**	11.3**	11.4**

* Computed only for States represented by at least 10 hunters who cooperated both years.
** Weighted average is the sum of the products of State averages multiplied by their specific weighting factors using only States represented by at least 15 hunters who cooperated both years.

Table 11.—Distribution of daily bag sizes in woodcock wing collection by harvest areas, 1969-70 and 1970-71 seasons

| Harvest Area | Year | Bag Size | | | | | | | | | | Total Successful Hunts |
| | | 1 | | 2 | | 3 | | 4 | | 5 | | |
		No.	%	No.	%	No.	%	No.	%	No.	%	
No. Central	1969-70	529	41.3	260	20.3	191	14.9	126	9.8	174	13.6	1,280
	1970-71	643	38.9	328	19.9	240	14.5	193	11.7	248	15.0	1,652
Mid-Central	1969-70	121	44.0	68	24.7	37	13.5	25	9.1	24	8.7	275
	1970-71	129	48.5	51	19.2	34	12.8	18	6.8	34	12.8	266
So. Central	1969-70	101	33.1	52	17.0	38	12.5	38	12.5	76	24.9	305
	1970-71	117	49.2	40	16.8	36	15.1	19	8.0	26	10.9	238
Central Total	1969-70	751	40.4	380	20.4	266	14.3	189	10.2	274	14.7	1,860
	1970-71	889	41.2	419	19.4	310	14.4	230	10.7	308	14.3	2,156
No. Atlantic	1969-70	1,370	37.7	822	22.6	551	15.2	395	10.9	492	13.6	3,630
	1970-71	1,366	36.0	828	21.8	584	15.4	467	12.3	548	14.4	3,793
Mid-Atlantic	1969-70	627	41.9	304	20.3	219	14.6	140	9.4	205	13.7	1,495
	1970-71	706	45.9	355	23.1	167	10.9	128	8.3	181	11.8	1,537
So. Atlantic	1969-70	74	61.2	27	22.3	6	5.0	9	7.4	5	4.1	121
	1970-71	127	57.2	35	15.8	20	9.0	17	7.7	23	10.4	222
Atlantic Total	1969-70	2,071	39.5	1,153	22.0	776	14.8	544	10.4	702	13.4	5,246
	1970-71	2,199	39.6	1,218	21.9	771	13.9	612	11.0	752	13.5	5,552
U.S. Total	1969-70	2,822	39.7	1,533	21.6	1,042	14.7	733	10.3	976	13.7	7,106
	1970-71	3,088	40.1	1,637	21.2	1,081	14.0	842	10.9	1,060	13.8	7,708

Table 12.--Summary of sex and age ratios in woodcock wing collection by periods - Central Region

Region	Period	Hunting Season	Sample Size*	Percent of Season Sample	Adult ♂ / 100 Adult ♀	Immature ♂ / 100 Immature ♀	Immatures / 100 Adult ♀
NORTH CENTRAL	I (to 9/30)	1968-69	702	21.4	183	80	166
		1969-70	761	26.1	128	92	199
		1970-71	1,013	26.8	163	97	208
	II (10/1-20)	1968-69	1,541	47.0	176	108	144
		1969-70	1,618	55.4	195	115	143
		1970-71	1,926	50.9	201	118	188
	III (after 10/20)	1968-69	1,037	31.6	153	93	137
		1969-70	542	18.6	185	102	99
		1970-71	843	22.3	161	99	188
MID-CENTRAL	I (to 10/10)	1968-69	212	33.3	149	82	240
		1969-70	170	31.1	107	113	184
		1970-71	215	40.5	142	117	166
	II (10/11 - 11/10)	1968-69	354	55.6	181	101	182
		1969-70	276	50.5	135	68	155
		1970-71	259	48.8	209	76	207
	III (after 11/10)	1968-69	71	11.1	83	61	253
		1969-70	101	18.5	59	45	263
		1970-71	58	10.7	180	61	167
SOUTH CENTRAL	I (to 12/10)	1968-69	124	19.0	156	61	279
		1969-70	125	15.1	141	81	232
		1970-71	39	8.2	162	200	138
	II (12/11 - 1/10)	1968-69	365	55.8	138	112	284
		1969-70	494	59.5	118	109	319
		1970-71	306	64.6	125	81	330
	III (after 1/10)	1968-69	165	25.2	150	118	177
		1969-70	211	25.4	163	77	244
		1970-71	129	27.2	157	124	227

*Excluding adult unknowns and unknown sex and age.

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Table 13.—Summary of sex and age ratios in woodcock wing collection by periods – Atlantic Region

Region	Period	Hunting Season	Sample Size*	Percent of Season Sample	Adult ♀ 100 Adult ♂	Immature ♀ 100 Immature ♂	Immatures 100 Adult ♀♂
NORTH ATLANTIC	I (to 10/10)	1968-69	2,424	27.4	137	100	187
		1969-70	1,938	23.0	156	107	146
		1970-71	2,140	23.9	174	100	189
	II (10/11-31)	1968-69	5,405	61.1	143	97	182
		1969-70	5,359	63.6	144	94	165
		1970-71	5,434	60.6	149	104	230
	III (after 10/31)	1968-69	1,015	11.5	128	81	230
		1969-70	1,129	13.4	96	87	211
		1970-71	1,393	15.5	123	83	348
MID-ATLANTIC	I (to 10/20)	1968-69	854	22.4	162	76	140
		1969-70	794	23.6	155	107	181
		1970-71	738	23.3	175	109	160
	II (10/21 – 11/20)	1968-69	2,568	67.5	145	99	194
		1969-70	2,114	62.9	119	96	209
		1970-71	1,973	62.3	155	108	200
	III (after 11/20)	1968-69	383	10.1	96	73	686
		1969-70	455	13.5	80	79	667
		1970-71	454	14.3	87	87	731
SOUTH ATLANTIC	I (to 12/10)	1968-69	74	29.6	95	88	165
		1969-70	50	24.9	144	87	215
		1970-71	20	5.0	200	40	350
	II (12/11 – 1/10)	1968-69	131	52.4	161	78	192
		1969-70	109	54.2	122	103	314
		1970-71	243	60.1	119	48	250
	III (after 1/10)	1968-69	45	18.0	160	138	388
		1969-70	42	20.9	60	73	433
		1970-71	141	34.9	91	57	231

*Excluding adult unknowns and unknown sex and age.

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Table 14.—Summary of wing collection sex and age ratios in selected Central Region States

State(s)	Period	Hunting Season	Sample Size*	Percent of Season Sample	Adult ♀ / 100 Adult ♂	Immature ♀ / 100 Immature ♂	Immatures / 100 Adult ♀
MICHIGAN	I (to 9/30)	1968-69	437	22.3	166	81	187
		1969-70	456	27.9	134	91	166
		1970-71	586	27.6	171	102	215
	II (10/1-20)	1968-69	868	44.2	171	105	149
		1969-70	915	55.9	210	118	123
		1970-71	1,058	49.9	260	134	212
	III (after 10/20)	1968-69	658	33.5	172	106	138
		1969-70	266	16.2	184	72	62
		1970-71	476	22.5	187	104	221
OHIO	I (to 10/10)	1968-69	167	37.0	148	70	250
		1969-70	140	36.6	108	130	158
		1970-71	185	43.7	141	107	165
	II (10/11--31)	1968-69	182	40.4	161	145	242
		1969-70	155	40.6	167	57	122
		1970-71	163	38.5	250	96	186
	III (after 10/31)	1968-69	102	22.6	163	48	168
		1969-70	87	22.8	88	95	182
		1970-71	75	17.7	200	77	162
LOUISIANA, MISSISSIPPI, and TEXAS	I (to 12/10)	1968-69	118	19.7	162	64	292
		1969-70	116	15.4	129	91	252
		1970-71	30	8.3	160	240	212
	II (12/11 - 1/10)	1968-69	340	56.7	160	112	291
		1969-70	455	60.3	110	106	338
		1970-71	250	68.9	129	89	378
	III (after 1/10)	1968-69	142	23.7	141	124	203
		1969-70	183	24.3	152	84	280
		1970-71	83	22.9	108	138	446

*Excluding adult unknowns and unknown sex and age.

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Table 15.--Summary of wing collection sex and age ratios in selected Atlantic Region States

State(s)	Period	Hunting Season	Sample Size*	Percent of Season Sample	Adult ♀ / 100 Adult ♂	Immature ♀ / 100 Immature ♂	Immatures / 100 Adult ♀
MAINE	I (to 10/10)	1968-69	1,243	37.9	137	98	198
		1969-70	1,013	33.3	169	96	142
		1970-71	1,040	28.8	158	92	176
	II (10/11-31)	1968-69	1,981	60.4	131	110	208
		1969-70	1,941	63.8	125	95	180
		1970-71	2,420	67.0	129	90	234
	III (after 10/31)	1968-69	55	1.7	170	93	165
		1969-70	86	2.8	100	105	191
		1970-71	153	4.2	113	73	262
PENNSYLVANIA	I (to 10/20)	1968-69	422	31.0	155	71	105
		1969-70	252	25.0	135	76	122
		1970-71	245	22.7	228	98	155
	II (10/21 - 11/10)	1968-69	850	62.5	143	97	133
		1969-70	627	62.3	97	97	157
		1970-71	712	66.0	153	135	153
	III (after 11/10)	1968-69	87	6.4	94	56	338
		1969-70	128	12.7	132	89	212
		1970-71	122	11.3	157	81	206
FLORIDA, GEORGIA, and SOUTH CAROLINA	I (to 12/10)	1968-69	46	24.9	87	143	138
		1969-70	33	22.3	183	100	145
		1970-71	24	12.6	100	33	400
	II (12/11 - 1/10)	1968-69	94	50.8	147	115	168
		1969-70	81	54.7	142	126	306
		1970-71	127	66.8	100	51	254
	III (after 1/10)	1968-69	45	24.3	160	129	400
		1969-70	34	23.0	83	64	460
		1970-71	39	20.5	180	47	278

*Excluding adult unknowns and unknown sex and age.

Table 16.--Distribution of harvest by 10-day periods in Central Region

Period columns header note: Percent of sample collected during period (dashes indicate season open but no wings collected)

STATE & YEAR	SEASON OPENED	SAMPLE SIZE	1 9/1-10	2	3	4 10/1-10	5	6	7 11/1-10	8	9	10 12/1-10	11	12	13 1/1-10	14	15	16 2/1-10	17	MEDIAN PERIOD OF HARVEST
MINN.																				
68-69	9/7	242	6.2	5.8	13.2	20.7	26.9	24.8	2.5											10/11-20
69-70	9/6	252	6.3	12.3	16.3	13.1	32.9	17.9	1.2											10/11-20
70-71	9/5	246	5.3	6.1	16.3	21.5	33.3	14.6	2.8											10/1-20
WIS.																				
68-69	9/14	1120		2.3	17.0	18.9	33.2	24.4	4.2	0.8										10/11-20
69-70	9/13	1048		8.1	13.2	18.7	38.1	15.6	5.5	0.1										10/11-20
70-71	9/12	1483		10.9	14.9	26.4	25.6	16.7	5.5											10/1-10
MICH.																				
68-69	9/15**	2054		9.3	14.3	19.9	23.9	28.4	4.0	0.1										10/11-20
69-70	9/15**	1684		11.8	16.4	27.1	28.7	11.7	3.8	0.5										10/1-10
70-71	9/15**	2166		12.8	15.3	29.6	20.0	16.6	5.3	0.4										10/1-10
ILL.																				
68-69	10/1	13							30.8	53.8	15.4									11/11-20
69-70	10/1	14				--	--	--	21.4	78.6	--	--								11/11-20
70-71	10/1	4				25.0	25.0	--	--	50.0	--	--								--
IND.																				
68-69	9/28	120		7.0	10.0	24.2	35.0	20.8	5.8	3.3	0.8	--								10/11-20
69-70	9/20	114		17.5	13.2	6.1	14.9	22.8	24.6	10.5	0.9	--								10/21-31
70-71	9/19	63			25.4	4.8	11.1	25.4	12.7	1.6	1.6									10/11-20
OHIO																				
68-69	9/20	487		3.5	13.3	20.7	19.9	20.7	18.3	3.1	0.4									10/11-20
69-70	9/19	394		11.2	13.7	12.7	22.8	17.3	12.2	10.2										10/11-20
70-71	9/18	434		14.3	11.0	18.4	16.3	22.3	12.4	4.8	0.5									10/11-20
MO.																				
68-69	10/1	12				--	41.7	--	25.0	33.3	--	--								11/1-10
69-70	10/1	11				9.1	--	--	9.1	27.3	45.5	9.1								11/21-30
70-71	10/1	32				3.1	9.4	25.0	43.8	15.6	3.1	--								11/1-10
KY.																				
68-69	11/21	2									100.0									11/21-30
69-70	11/20	7								28.6	57.1	14.3								11/21-30
70-71	11/19	4									50.0	50.0								11/1-10
OKLA.																				
68-69	11/21	0																		--
69-70	11/2	1									100.0									--
70-71	11/21	4							--	--	50.0	25.0	25.0							11/21-30
ARK.																				
68-69	11/28	16										18.8	6.3	56.3	6.3	12.5				12/21-31
69-70	11/28	40										--	27.5	15.0	12.5	25.0	20.0			1/1-10
70-71	12/1	50										26.0	14.0	14.0	20.0	8.0	16.0	2.0		12/21-31
TENN.																				
68-69	11/18	37								45.9	48.6	2.7	--	--	--	2.7				11/21-30
69-70	11/17	24								45.8	25.0	4.2	12.5		--	8.3	4.2			11/21-30
70-71	11/26	21									71.4	14.3	4.8	4.8		4.8				11/21-30
TEX.																				
68-69	11/23	39									5.1	2.6	20.5	5.1	2.6	10.3	53.8			1/21-31
69-70	11/22	94									5.3	14.9	19.1	5.3	16.0	28.7	10.6			1/1-10
70-71	11/21	19									10.5	21.1	10.5	5.3	21.1	5.3	26.3			1/1-10
LA.																				
68-69	11/28	500									5.4	13.6	15.0	28.0	16.8	12.6	8.6			12/21-31
69-70	11/27	641									5.3	8.9	13.1	22.2	27.6	11.7	11.2			1/1-10
70-71	11/26	332									3.9	1.8	18.7	38.9	13.3	9.0	11.4	3.0		12/21-31
MISS.																				
68-69	11/30	83									7.2	16.9	14.5	6.0	33.7	10.8	10.8			1/1-10
69-70	11/28	30										10.0	10.0	50.0	16.7	13.3	--			12/21-31
70-71	12/12	33											3.0	18.2	27.3	6.1	24.2			1/11-21
ALA.																				
68-69	11/28	42										9.5	19.0	--	16.7	26.2	28.6		6.1	1/11-20
69-70	11/28	35										14.3	17.1	11.4	20.0	22.9	5.7	15.2		12/21-31
70-71	12/13	52								8.6		14.3	23.1	11.5	32.7	1.9	13.5	15.4	1.9	1/1-10

*Eleven days in last period of 31-day months.
**Later opening in Zone 3 (approximately southern one-third of State).

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Table 17.--Distribution of harvest by 10-day periods in Atlantic Region

Percent of sample collected during period (dashes indicate season open but no wings collected)

STATE & YEAR	SEASON OPENED	SAMPLE SIZE	1 9/1-10	2	3	4 10/1-10	5	6	7 11/1-10	8	9	10 12/1-10	11	12	13 1/1-10	14	15	16 2/1-10	17	MEDIAN PERIOD OF HARVEST
MAINE																				
68-69	9/24	3495			13.3	24.8	28.7	31.4	1.7	0.1										10/11-20
69-70	9/24	3167			12.8	20.5	33.2	30.8	2.0	0.8										10/11-20
70-71	10/1	3715				28.9	28.6	38.4	3.7	0.4	T									10/11-20
N.Y.																				
68-69	9/23**	2123			3.4	16.0	32.9	33.8	12.5	1.3	0.2									10/11-20
69-70	9/22**	2161			3.3	17.8	32.9	28.8	11.6	5.2	0.5									10/11-20
70-71	9/21**	2035			3.5	20.1	24.0	29.1	17.7	4.8	0.8									10/21-31
VT.																				
68-69	9/28	663			14.2	26.1	29.4	25.9	3.9	0.5	--									10/11-20
69-70	9/27	395			9.9	26.8	46.3	14.9	1.8	0.3	--									10/11-20
70-71	9/26	611			8.3	29.1	25.9	24.1	11.8	0.6	0.2									10/11-20
N.H.																				
68-69	10/1	1451				32.9	28.4	26.2	12.3	0.1	--	--								10/11-20
69-70	10/1	1026				28.2	38.5	22.3	9.8	1.2	--	--								10/11-20
70-71	10/1	1185				28.0	25.1	29.8	16.9	0.1	0.2	--								10/11-20
MASS.																				
68-69	10/10	730				7.9	30.4	42.6	16.8	1.6	0.5	0.5								10/21-31
69-70	10/10	1033				6.1	36.6	36.4	11.5	8.1	1.3	0.5								10/21-31
70-71	10/10	749				11.1	36.2	37.0	12.0	3.1	0.7	1.1								10/21-31
CONN.																				
68-69	10/19	647					7.4	50.7	32.1	4.5	4.6	0.5	--	0.2						10/21/31
69-70	10/18	859					11.2	51.2	23.6	10.8	2.7	0.5	--							10/21/31
70-71	10/17	825					20.2	37.0	23.4	14.5	3.8	1.1	--							10/21/31
R.I.																				
68-69	10/26	112						39.3	47.3	4.5	8.9	--	--	--						11/1-10
69-70	10/25	56						35.7	39.3	10.7	12.5	--	--	--						11/1-10
70-71	10/24	65						33.8	46.2	7.7	7.7	1.2	--	1.5						11/1-10
PA.																				
68-69	10/12	1419					31.2	39.7	22.4	4.3	2.3	--	--							10/21-31
69-70	10/18	1040					25.5	42.9	19.1	9.4	3.1	--	--							10/21-31
70-71	10/17	1134					22.4	41.1	24.7	8.6	3.1	--	--							10/21-31
N.J.																				
68-69	10/5	2261				10.3	8.5	25.5	29.6	13.5	10.5	2.0	--							11/1-10
69-70	10/4	2102				10.6	14.1	29.1	20.6	11.8	9.4	4.0	--							10/21-31
70-71	10/3	1609				12.1	17.0	23.9	21.4	14.1	8.9	2.6	--							10/21-31
W. VA.																				
68-69	10/12***	71					16.9	28.2	32.4	8.5	14.1	--	--	--						11/1-10
69-70	10/11***	80					20.0	30.0	26.3	23.8	--	--	--	--						10/21-31
70-71	10/10***	159		0.6	3.8	6.3	10.7	30.8	25.8	18.9	3.1									10/21-31
MD.																				
68-69	10/16	128					10.2	16.4	31.3	19.5	9.4	0.8	12.5							11/1-10
69-70	10/10	122				--	7.4	22.1	24.6	14.8	12.3	16.4	2.5							11/1-10
70-71	10/9	176				1.1	6.8	25.6	18.8	14.2	19.3	10.2	4.0							11/1-10
DEL.																				
68-69	11/22	22									72.7	9.1	4.5	9.1	4.5					11/21-30
69-70	11/21	11									63.6	27.3	9.1	--	--	--	--			11/21-30
70-71	11/20	32								9.4	18.8	9.4	18.8	18.8	9.4	12.5	3.1			12/11-20
VA.																				
68-69	11/18	42								23.8	47.6	9.5	7.1	--	0.9	11.9				11/21-30
69-70	11/17	113								10.6	29.2	21.2	21.2	3.5		13.3				12/1-10
70-71	11/16	166								6.6	24.1	15.1	9.6	15.1	9.0	20.1				12/11-20
N.C.																				
68-69	11/16	66								9.2	20.0	13.8	23.1	20.0	13.8					12/11-20
69-70	11/28	55									9.1	21.8	16.4	21.8	16.4	10.9	3.6			12/21-31
70-71	12/11	209											14.8	21.5	19.1	7.2	26.3	7.2	3.8	1/1-10
S.C.																				
68-69	11/28	119									13.4	8.4	23.5	20.2	3.4	10.9	20.2			12/21-31
69-70	11/28	81									2.5	8.6	25.9	7.4	25.9	14.8	14.8			1/1-10
70-71	12/13	67											13.4	17.9	26.9	7.5	17.9	3.0	13.4	1/1-10
GA.																				
68-69	11/28	50									8.0	22.0	22.0	10.0	22.0	12.0	4.0			12/11-20
69-70	11/20	40								5.0	15.0	27.5	12.5	12.5	12.5	10.0	5.0			12/11-20
70-71	11/20	101								2.0	8.9	5.9	19.8	26.7	21.8	8.9	5.9			12/21-31
FLA.																				
68-69	11/9	18								11.1	5.6	11.1	16.7	55.6						12/21-31
69-70	11/15	29								3.4	10.3	3.4	17.2	24.1	27.6	13.8				12/21-31
70-71	11/21	31							--	--	--	12.9	12.9	41.9	9.7	12.9	9.7			12/21-31

*Eleven days in last period of 31-day months.
**Later opening in southern part of State including Long Island.
***Except for special 8-day early season in late September.

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Table 18.--Distribution of 1969-70 and 1970-71 wing collections by 7-day periods* - Central Region

State	Year	Opening Date	Sample Size	Percent of kill in single period										Percent of kill in combined periods		
				1	2	3	4	5	6	7	8	9	10	1&2	3-6	7-10
Ala.	1969-70	11-28	34	17.6	2.9	8.8	20.6	--	20.6	5.9	17.6	5.9	--	20.6	50.0	29.4
	1970-71	12-13	51	21.6	2.0	15.7	23.5	3.9	3.9	2.0	19.6	5.9	2.0	23.5	47.1	29.4
Ark.	1969-70	11-28	40	--	--	25.0	10.0	12.5	7.5	20.0	10.0	10.0	5.0	0	55.0	45.0
	1970-71	12-1	56	23.2	14.3	3.6	7.1	21.4	5.4	8.9	--	14.3	1.8	37.5	37.5	25.0
Ill.	1969-70	10-1	14	--	--	--	--	21.4	--	78.6	--	--	--	--	21.4	78.6
	1970-71	10-1	4	--	25.0	25.0	--	--	--	50.0	--	--	--	25.0	25.0	50.0
Ind.	1969-70	9-20	115	8.7	13.9	3.5	3.5	13.0	20.9	14.8	13.0	8.7	--	22.6	40.9	36.5
	1970-71	9-19	60	33.3	6.7	3.3	6.7	8.3	16.7	11.7	10.0	1.7	1.7	40.0	35.0	25.0
Ky.	1969-70	11-20	7	85.7	14.3	--	--	--	--	--	--	--	--	100.0	--	--
	1970-71	11-19	4	25.0	75.0	--	--	--	--	--	--	--	--	100.0	--	--
La.	1969-70	11-27	641	6.6	7.6	9.2	9.4	16.7	18.7	12.6	10.0	8.1	1.1	14.2	54.0	31.8
	1970-71	12-9	332	3.9**	7.5	18.4	22.3	17.8	9.0	5.1	11.1	1.8	3.0	11.4	67.5	21.1
Mich.	1969-70	9-15	1,684	14.7	10.6	19.1	17.0	18.6	13.8	3.7	1.9	0.5	Closed	25.2	68.6	6.1
	1970-71	9-15	2,165	13.8	12.0	17.3	19.4	13.4	13.6	6.8	3.3	0.4	Closed	25.7	63.7	10.5
Minn.	1969-70	9-6	252	8.3	8.7	5.6	14.3	11.1	25.8	13.5	11.5	1.2	--	17.1	56.7	26.2
	1970-71	9-5	246	5.3	5.3	4.1	15.0	13.4	26.0	17.9	8.1	4.9	--	10.6	58.5	30.9
Miss.	1969-70	11-28	32	--	9.4	3.1	37.5	21.9	12.5	3.1	12.5	--	--	9.4	75.0	15.6
	1970-71	12-12	33	--	6.1	18.2	12.1	12.1	6.1	24.2	6.1	12.1	3.0	6.1	48.5	45.5
Mo.	1969-70	10-1	11	9.1	--	--	--	9.1	--	27.3	36.4	9.1	9.1	9.1	9.1	81.8
	1970-71	10-1	32	3.1	--	9.4	15.6	34.4	18.8	12.5	6.2	--	--	3.1	78.1	18.8
Ohio	1969-70	9-19	394	19.0	8.4	5.8	15.7	17.0	10.1	7.1	11.9	4.8	--	27.4	48.7	23.9
	1970-71	9-18	435	17.5	12.0	9.7	9.4	12.9	13.8	12.9	7.4	4.1	0.5	29.4	45.7	24.8
Okla.	1969-70	11-2	1	--	--	100.0	--	--	--	--	--	--	--	--	100.0	--
	1970-71	11-21	4	25.0	50.0	--	--	25.0	--	--	--	--	--	75.0	25.0	--
Tenn.	1969-70	11-17	47	72.3	12.8	2.1	--	6.4	--	--	--	4.3	2.1	85.1	8.5	6.4
	1970-71	11-26	21	76.2	9.5	4.8	--	4.8	--	--	4.8	--	--	85.7	9.5	4.8
Tex.	1969-70	11-22	94	5.3	14.9	--	13.8	5.3	10.6	5.3	19.1	20.2	5.3	20.2	29.8	50.0
	1970-71	11-21	20	5.0	20.0	10.0	10.0	--	5.0	20.0	5.0	--	25.0	25.0	25.0	50.0
Wis.	1969-70	9-13	1,049	6.8	7.1	9.8	16.3	22.7	21.5	9.4	4.2	1.6	0.5	13.9	70.4	15.7
	1970-71	9-12	1,480	7.4	6.6	12.6	17.5	23.0	15.0	10.3	5.8	1.7	0.1	14.0	68.2	17.8

*First period begins on season opening date; 10th period 2 days or less.
**Four-day period Nov. 26-29 only.

Table 19.--Distribution of 1969-70 and 1970-71 wing-collections by 7-day periods* - Atlantic Region

State	Year	Opening Date	Sample Size	Percent of kill in single period										Percent of kill in combined periods		
				1	2	3	4	5	6	7	8	9	10	1&2	3-6	7-10
Conn.	1969-70	10-18	856	29.4	32.8	16.5	12.6	5.6	2.3	0.5	0.2	--	--	62.3	37.0	0.7
	1970-71	10-17	821	27.3	23.0	18.6	17.4	8.2	3.3	1.1	0.5	--	0.6	50.3	47.5	2.2
Del.	1969-70	11-21	11	54.5	27.3	18.2	--	--	--	--	--	--	--	81.8	18.2	--
	1970-71	11-20	32	18.8	12.5	6.2	--	21.9	15.6	9.4	6.2	9.4	--	31.2	43.8	25.0
Fla.	1969-70	11-15	29	3.4	10.3	3.4	6.9	10.3	3.4	20.7	27.6	13.8	--	13.8	24.1	62.1
	1970-71	11-21	31	--	9.7	3.2	9.7	16.1	29.0	9.7	12.9	3.2	6.5	9.7	58.1	32.3
Ga.	1969-70	11-20	40	12.5	15.0	20.0	12.5	--	12.5	7.5	10.0	10.0	--	27.5	45.0	27.5
	1970-71	11-20	106	7.5	4.7	3.8	11.3	13.2	19.8	14.2	6.6	8.5	10.4	12.3	48.1	39.6
Maine	1969-70	9-24	3,161	12.6	14.1	17.5	26.6	19.5	8.1	1.0	0.6	Closed	Closed	26.7	71.7	1.6
	1970-71	10-1	3,715	18.5	20.1	23.2	24.3	11.4	2.1	0.2	0.2	--	Closed	38.6	61.0	0.4
Md.	1969-70	10-10	122	3.3	8.2	18.0	15.6	12.3	11.5	8.2	13.9	8.2	0.8	11.5	57.4	31.1
	1970-71	10-9	176	1.7	6.8	13.6	17.6	15.9	9.1	14.2	8.5	8.5	4.0	8.5	56.3	35.2
Mass.	1969-70	10-10	1,032	29.6	23.5	23.0	11.2	6.7	4.7	1.0	0.3	Closed	Closed	53.1	45.6	1.3
	1970-71	10-10	753	31.5	24.2	24.0	10.2	8.5	0.5	0.7	0.4	Closed	Closed	55.6	43.3	1.1
N.H.	1969-70	10-1	1,026	23.6	18.9	25.8	16.1	11.3	3.1	1.2	--	--	Closed	42.5	56.3	1.2
	1970-71	10-1	1,185	20.5	16.4	18.8	19.1	16.0	8.9	0.1	0.1	0.1	Closed	36.9	62.9	0.3
N.J.	1969-70	10-4	2,102	10.8	8.4	14.0	20.8	15.5	8.9	10.1	6.7	3.6	1.2	19.2	59.2	21.6
	1970-71	10-3	1,612	9.4	7.3	16.9	15.7	12.6	17.4	9.1	6.7	3.7	1.3	16.6	62.6	20.8
N.Y.	1969-70	9-22	2,161	2.9	12.4	13.9	21.1	24.6	11.9	7.0	4.7	1.3	0.1	15.3	71.6	13.1
	1970-71	9-21	2,035	2.8	12.1	11.4	14.3	21.7	17.3	12.8	5.2	2.1	0.1	15.0	64.7	20.3
N.C.	1969-70	11-28	53	7.5	20.8	3.8	22.6	13.2	7.5	18.9	1.9	1.9	1.9	28.3	47.2	24.5
	1970-71	12-11	209	8.6	12.9	14.8	14.3	7.2	7.2	12.0	15.3	5.3	2.4	21.5	43.5	34.9
Pa.	1969-70	10-18	1,032	47.0	20.7	14.2	11.1	4.9	1.6	0.4	--	--	--	67.7	31.9	0.4
	1970-71	10-17	1,107	32.3	23.2	25.2	11.3	4.8	2.7	0.5	--	--	--	55.6	44.0	0.5
R.I.	1969-70	10-25	56	35.7	25.0	14.3	10.7	12.5	1.8	Closed	--	--	--	60.7	39.3	--
	1970-71	10-24	65	29.2	15.4	40.0	3.1	6.2	4.6	Closed	--	--	--	44.6	53.8	1.5
S.C.	1969-70	11-28	81	4.9	6.2	14.8	13.6	4.9	13.6	12.3	14.8	11.1	3.7	11.1	46.9	42.0
	1970-71	12-13	66	9.1	16.7	13.6	10.6	10.6	16.7	4.5	4.5	3.0	10.6	25.8	51.5	22.7
Vt.	1969-70	9-27	393	14.8	21.6	28.5	22.1	10.9	1.8	0.3	--	--	--	36.4	63.4	0.3
	1970-71	9-26	609	10.2	21.7	18.7	18.1	14.8	13.8	2.6	--	0.2	--	31.9	65.4	2.8
Va.	1969-70	11-17	113	20.4	19.5	6.0	15.5	15.0	0.9	3.5	--	9.7	3.5	39.8	43.4	16.8
	1970-71	11-16	168	8.3	17.9	20.0	17.5	7.1	14.9	1.8	7.1	13.7	7.7	26.2	43.5	30.4
W. Va.	1969-70	10-11**	80	10.0	20.0	20.0	17.5	30.0	2.5	--	--	--	Closed	30.0	70.0	--
	1970-71	10-10**	147	8.8	9.5	22.4	19.0	27.2	9.5	3.4	--	--	Closed	18.4	78.2	3.4

*First period begins on season opening date; 10th period 2 days or less.
**Excluding special 8-day season in September.

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Table 20.--Waterfowl hunters in States where woodcock are hunted, as determined from waterfowl mail survey

REFERENCE AREA	YEAR							PERCENT CHANGE*
	1964-65	1965-66	1966-67	1967-68	1968-69	1969-70	1970-71	
North Central	310,790	300,760	341,880	360,840	332,200	365,730	454,520	+34.1
Mid-Central	161,070	157,980	187,600	212,340	179,550	208,730	251,330	+44.2
South Central	255,360	237,270	299,350	326,090	268,420	319,930	406,040	+47.4
Region Total	727,220	696,010	828,830	899,270	780,170	894,390	1,111,890	+41.0
North Atlantic	100,410	108,680	124,630	134,260	150,220	168,470	190,840	+71.8
Mid-Atlantic	110,530	118,160	126,160	140,740	148,780	171,240	187,390	+56.8
South Atlantic	69,900	70,720	79,540	81,280	78,840	92,530	110,780	+44.6
Region Total	280,840	297,560	330,330	356,280	377,840	432,240	489,010	+59.3
Northern Zone	411,200	409,440	466,510	495,100	482,420	534,200	645,360	+43.7
Mid-Zone	271,600	276,140	313,760	353,080	328,330	379,970	438,720	+49.5
Southern Zone	325,260	307,990	378,890	407,370	347,260	412,460	516,820	+46.7
U.S. Total in woodcock range	1,008,060	993,570	1,159,160	1,255,550	1,158,010	1,326,630	1,600,900	+46.3

*Change over the 5-year period between the average of the first 2 years and the average of the last 2 years.

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Table 21.--Waterfowl hunters who hunted woodcock, as determined from waterfowl mail survey

REFERENCE AREA	YEAR							PERCENT CHANGE*
	1964-65	1965-66	1966-67	1967-68	1968-69	1969-70	1970-71	
North Central	46,038	37,010	35,142	42,369	34,266	47,832	69,667	+41.5
Mid-Central	10,059	7,970	8,005	9,639	8,546	15,421	16,041	+74.5
South Central	14,843	10,880	16,282	17,602	14,586	22,952	25,694	+89.1
Region Total	70,940	55,860	59,429	69,610	57,398	86,205	111,402	+55.8
North Atlantic	27,765	33,340	35,230	39,280	45,075	54,813	56,702	+82.5
Mid-Atlantic	14,211	18,200	15,766	23,645	23,660	32,561	38,069	+117.9
South Atlantic	4,460	4,440	5,485	5,607	7,661	6,682	10,115	+88.7
Region Total	46,436	55,980	56,481	68,532	76,396	94,056	104,886	+94.2
Northern Zone	73,803	70,350	70,372	81,649	79,341	102,645	126,369	+58.9
Mid-Zone	24,270	26,170	23,771	33,284	32,206	47,982	54,110	+102.4
Southern Zone	19,303	15,320	21,767	23,209	22,247	29,634	35,809	+89.0
U.S. Total in woodcock range	117,376	111,840	115,910	138,142	133,794	180,261	216,288	+73.0

*Change over the 5-year period between the average of the first 2 years and the average of the last 2 years.

Table 22.--Woodcock harvest by waterfowl hunters, as determined from waterfowl mail survey

| REFERENCE AREA | YEAR | | | | | | | PERCENT CHANGE* |
	1964-65	1965-66	1966-67	1967-68	1968-69	1969-70	1970-71	
North Central	164,164	117,077	115,086	132,563	79,746	117,610	196,283	+11.6
Mid-Central	32,142	23,879	22,869	25,350	27,756	47,511	35,102	+47.5
South Central	97,142	43,373	73,197	90,535	94,608	141,103	124,154	+88.8
Region Total	293,448	184,329	211,152	248,448	202,110	306,224	355,539	+38.5
North Atlantic	111,378	129,133	131,354	159,316	184,016	188,677	194,318	+59.2
Mid-Atlantic	39,999	51,891	43,390	76,006	76,081	101,198	105,972	+125.5
South Atlantic	21,573	14,815	18,523	22,157	31,639	24,283	31,834	+54.2
Region Total	172,950	195,839	193,267	257,479	291,736	314,158	332,124	+75.2
Northern Zone	275,542	246,210	246,440	291,879	263,762	306,287	390,601	+33.6
Mid-Zone	72,141	75,770	66,259	101,356	103,837	148,709	141,074	+95.9
Southern Zone	118,715	58,188	91,720	112,692	126,247	165,386	155,988	+81.7
U.S. Total in woodcock range	466,398	380,168	404,419	505,927	493,846	620,382	687,663	+54.5

*Change over the 5-year period between the average of the first 2 years and the average of the last 2 years.

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Table 23--Comparison of woodcock harvest reported by waterfowl hunters with that reported by State game kill surveys

	Michigan			New York		
Year	Woodcock Reported in Waterfowl Mail Survey	Woodcock Reported in State Kill Survey	Percent of State Kill Reported in Waterfowl Mail Survey	Woodcock Reported in Waterfowl Mail Survey	Woodcock Reported in State Kill Survey	Percent of State Kill Reported in Waterfowl Mail Survey
1964	94,554	176,470	53.6	39,672	110,623	35.9
1965	63,025	152,310	41.4	44,365	107,090	41.4
1966	68,813	180,750	38.1	49,468	118,764	41.7
1967	73,866	180,480	40.9	77,397	134,566	57.5
1968	43,125	160,840	26.8	78,166	138,252	56.5
1969	56,678	141,950	39.9	86,501	158,397	54.6

Table 24.--Bureau-funded woodcock research in progress in FY 1971 in the United States*

Organization	Activity	Annual Allotment	Duration (Years)	Scheduled Expiration (Fiscal Year)
Bureau of Sport Fisheries and Wildlife				
MBPS - Orono Station	Habitat, banding, and behavioral studies**	$25,000	Long term	Indefinite
Moosehorn Refuge	Banding and habitat studies	5,000	Long term	Indefinite
Indiana	Breeding ground banding**	5,100	5	1972
Maine	Breeding ground banding**	5,250	5	1972
	Behavioral studies (telemetry)	2,667	3	1971
Massachusetts	Development of random singing-ground survey and breeding ground banding**	2,400	3	1972
Minnesota	Habitat studies**	500	3	1972
	Behavioral studies (telemetry)**	14,000	3	1972
New Hampshire	Development of random singing-ground survey**	0***	3	1971
New York	Breeding ground banding**	5,250	5	1972
Ohio	Development of random singing-ground survey**	2,400	3	1972
Pennsylvania	Breeding ground banding**	5,250	5	1972
West Virginia	Breeding ground banding**	5,250	5	1972
	Parasite studies**	6,000	3	1973
Wisconsin	Breeding ground banding**	5,250	5	1972

*In addition, the following Provinces and States are supporting projects under one or more of the activities listed, from their own resources and/or (in the States) Federal Aid Funds: Connecticut, Illinois, Massachusetts, Michigan, Mississippi, New Brunswick, Nova Scotia, Ontario, Prince Edward Island, Virginia, and West Virginia.

**Funds made available through the Accelerated Research Program for Shore and Upland Migratory Game Birds.

***Carry-over of unused 1970 funds only.

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Table 25.—Woodcock banding by States, 1961-70 (excluding experimental birds)

LOCATION	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	10-YR TOTAL
ATLANTIC REG.											
Conn.				1				1	2	22	26
Fla.		1							4		5
Ga.				1		1			4		6
Maine	35	263	515	457	301	471	549	732	828	867	5,018
Md.	4	6	22	12	16	13	7	5	2	4	91
Mass.	1	5	1	5	1	8	121		4	30	176
N.B.				17	5				261	191	474
N.H.							4	5			9
N.J.	9	6	13	12	7	13	4	645	345	566	1,620
N.Y.	8	9	15	20	9	19	8	14	485	473	1,060
N.C.	1	1						3		1	6
N.S.				34				1		7	42
Pa.	19	45	51	9	6	9	5	36	38	69	287
P.E.I.	1					1					2
R.I.	2		2			6	2	7	9	6	32
S.C.			1		1	1	1		1		7
Va.	1	1						3	7	2	14
W. Va.	3		8	16	103	301	434	516	249	291	1,921
REGIONAL TOTAL	84	337	628	584	449	843	1,135	1,968	2,239	2,529	10,796
CENTRAL REGION											
Ala.	1			2	2			2	2	1	9
Ill.		1	2		1	2	2	3	4		15
Ind.			1	5	8				76	69	160
Iowa		2	3	1	5	3	2			3	19
La.		748	292	2,549	815	1,230	900	1,076	472	521	8,603
Mich.	51	50	124	79	355	365	396	868	403	397	3,088
Minn.		1	13	4	3		17	79	111	56	284
Miss.								1	68	110	179
Ohio			6	8		6	6		3	17	47
Okla.			1								1
Ont.	6	12	10	20	41	14	22	19	26	9	179
Tenn.	1		1	1	1		1	3		1	9
Tex.									1		1
Wis.	8	9	19	31	20	27	22	281	185	473	1,075
REGIONAL TOTAL	67	824	472	2,700	1,251	1,647	1,368	2,332	1,351	1,657	13,669
COMB. TOTAL	151	1,161	1,100	3,284	1,700	2,490	2,503	4,300	3,590	4,186	24,465

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Table 26.—Summary of woodcock band recovery file through October 29, 1971 (includes all "How obtained" codes)

State or Province of Recovery	State or Province of Banding																							Range Total
	ATLANTIC REGION												Region Totals	CENTRAL REGION									Region Total	
	Conn.	Maine	Md.	Mass.	N.B.	N.H.	N.J.	N.Y.	N.S.	Pa.	Vt.	W.Va.		Ala.	Ind.	La.	Mich.	Minn.	Miss.	Ohio	Ont.	Wis.		
ATLANTIC REGION																								
Conn.	2	14		1	3		4			1	1		26			2							2	28
Del.		1			1		1						3											3
Fla.		3		1	1								5											5
Ga.		8	1	3				1		1			14			2	4				1		7	21
Maine		277	3	3	4	1							288			6							6	294
Md.		4	3										7											7
Mass.		15		89			1					1	106			6							6	112
N.B.		9		2	31								42			1							1	43
N.H.		8		4	1	1							14			8							8	22
N.J.		18		2	3		44	1				4	72			3							3	75
N.Y.		12		4	3		2	93				3	117			18			1	1	1		21	138
N.C.		12		2	1		6	2				2	25			1							1	26
N.S.									9				9	1		7							8	17
Pa.		13		2	3		5	5		59		4	91			27					1		28	119
Que.								1				1	2			2							2	4
S.C.		11		2			1			1		3	18			2							2	20
Vt.		1		1									2			3							3	5
Va.		11		3			5	2				4	25											25
W.Va.				1								407	408			3							3	411
Subtotal	2	417	7	114	50	2	72	108	9	62	1	430	1,274	1	–	91	4	–	1	1	3	–	101	1,375
CENTRAL REGION																								
Ala.		1		1								2	4			15	4		1		1	1	22	26
Ark.																18					1	4	23	23
Ill.																6							6	6
Ind.															3	6	1						10	10
Iowa																2							2	2
Ky.		1											1		1	9							10	11
La.		4			1			2				3	10		1	179	14		1		1	6	202	212
Mich.														1		118	325	1				3	447	447
Minn.																13		12				1	26	26
Miss.		1					1	1		1		5	9	1		42	4	1	1		1	1	50	59
Mo.																7	1	1					9	9
Ohio				1									1			12				3			15	16
Okla.																	1						1	1
Ont.							1	1					2			19					5	1	25	27
Tenn.		2					1						3			5			1				6	9
Tex.		2											2			2	1					1	4	6
Wis.																48						20	68	68
Subtotal	–	11	–	2	1	–	3	4	–	1	–	10	32	5	5	501	351	15	4	3	8	39	926	958
Total	2	428	7	116	51	2	75	112	9	63	1	440	1,306	1	5	592	355	15	5	4	11	39	1,027	2,333

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As the Nation's principal conservation agency, the Department of the Interior has basic responsibilities for water, fish, wildlife, mineral, land, park, and recreational resources. Indian and Territorial affairs are other major concerns of this department of natural resources.

The Department works to assure the wisest choice in managing all our resources so that each shall make its full contribution to a better United States now and in the future.

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