

- (6) Wherever blinds border cultivated lands or building sites, and especially if a high, actively eroding bank is present, special efforts should be made to erect a blind that will afford the best protection for nesting water-fowl.
- (7) The presence and management of osprey, which generally prefer blinds more than 100 yards from shore, may increase the probability of clutch success due to the raptor's defense against crows.

In addition, it was discovered that broods had perished because they could not get out of blinds. Blind doors should be nailed open after waterfowl hunting season.

Some sections of Delaware and Virginia permit offshore blinds. Whether other states having sufficient waterfowl nesting populations permit such blinds is unknown. If they do, more waterfowl nesting sites can be made available by the proper management of offshore blinds as an increasing human population destroys existing nesting habitats.

SOME OBSERVATIONS ON THE RECOVERY OF DIVING DUCKS BANDED IN THE MARYLAND PORTION OF CHESAPEAKE BAY *

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ABSTRACT

During the six years 1952 to 1957, a total of 13,269 waterfowl of three species (lesser scaup, redhead and canvasback) were banded in Maryland. From these, 1,125 band recoveries had been reported to June, 1958.

Bands recovered through hunters (shot) made up the great majority of all reported, ranging from 91.9 percent of all recovered for lesser scaup to 96.5 percent for redheads.

Waterfowl of the three species investigated were reported from 33 states, six Canadian provinces and the Bahamas.

Some idea of the chronological order of migration was obtained by plotting band recovery reports by monthly and biweekly periods for the various states.

The percentages of bands recovered for the three species were compared. Some apparent differences were noted in the first year recovery rates of adults and juveniles banded during the post-hunting season period.

During 1954, a program designed to gain further knowledge of the movements and biology of wintering waterfowl on the Chesapeake Bay was instituted by the Maryland Department of Game and Inland Fish. This program, encompassing the banding of wild waterfowl and the evaluation of the recoveries of these banded waterfowl, was partly a result of a request by the Atlantic Waterfowl Council who felt emphasis should be placed on banding scaup, both greater and lesser, coot, Canada geese and black ducks. During the years 1954 to 1957 inclusive, cooperation in this banding program was obtained from both the United States Fish and Wildlife Service and the Maryland Department of Research and Education.

Prior to 1954 some limited banding of diving ducks by Maryland personnel had taken place. Although the major banding occurred subsequent to 1954, the results of the limited bandings of 1952 and 1953 are included in this report.

For our purposes Maryland may be subdivided into two sections: the Eastern Shore and the Western Shore, both readily identified with the Chesapeake Bay

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as the central reference point. On the Western shore, three areas were used for varying periods for the purpose of trapping and banding waterfowl. These included Gibson Island, the Patuxent River and Smith Creek. Those areas utilized on the Eastern Shore included Howells Point, Eastern Bay, the Chester River and Hoopers Island. (See Figure 1.)

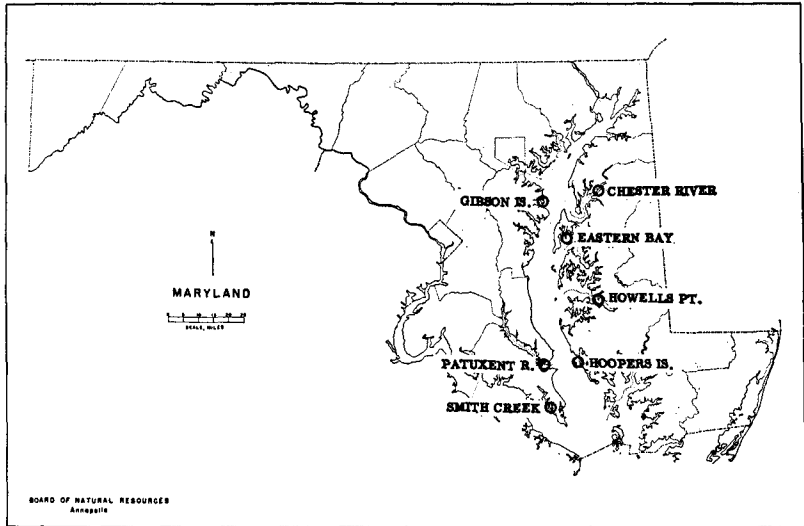


FIGURE 1. LOCATION OF BANDING STATIONS

Although diving ducks of nearly all species generally found wintering on the Chesapeake Bay were trapped and banded during the period covered, it was decided for this paper to limit the examination of results to only three species: lesser scaup, canvasbacks and redheads. Since these represent the three most important diving ducks to the hunters and since comparatively greater numbers were banded (with consequent larger recoveries) this limitation was felt to be desirable.

As might be expected, the various banding stations showed little consistency in the number of each species banded during the various years (Table I). Where one year lesser scaup were banded in large numbers, the following year, redheads or canvasbacks often made up the majority of ducks banded. Apparently, this is not the result of differences in trapping techniques, but rather changes in distribution and relative abundance of waterfowl species within the several areas from year to year.

An examination of Table I discloses that 13,629 diving ducks of the three species concerned were banded during the period 1952-1957 inclusive. From these, 1,125 band recoveries or about 8 percent had been reported to June, 1958. Bands recovered through hunters (*i. e.*, shot) made up the great majority of all reported, ranging from 91.6 percent of all scaup recoveries to 96.5 percent for redheads (Table II). Canvasback hunting recoveries approximated that of redheads with 95.1 percent in this category. Other recovery categories, with one exception, showed relatively comparable figures (Table II). The exception is the indication that nearly 5 percent (4.8%) of all lesser scaup bands recovered were reported taken in fish nets. In the Chesapeake Bay during the wintering period these "fish net" reports are attributable to waterfowl caught and drowned in gill nets which are fished in several ways. Apparently, differences in feeding behavior or location of feeding grounds lessens the vulnerability of the redhead and canvasback to this type of mortality.

TABLE I
NUMBER OF WATERFOWL Banded BY YEAR AT EACH STATION IN MARYLAND
Area and Banding Location *Year* *L. Scaup* *Redhead* *Canvasback* *Total*

<i>Western Shore</i>					
Gibson Island *	1952	93	-	-	94
	1953	61	133	12	206
Patuxent River †	1954	797	-	1	798
	1955	258	207	5	470
	1956	31	2	-	33
	1957	458	1	3	462
Smiths Creek ‡	1955	104	-	-	104
<i>Eastern Shore</i>					
Chester River ‡	1955	734	40	429	1,203
	1956	984	304	571	1,859
Eastern Bay *	1954	608	5	6	619
	1956	56	430	272	758
	1957	393	70	1,024	1,487
Howells Point *	1952	16	1	28	45
Hoopers Island ‡	1957	1,102	3,963	66	5,131
TOTAL		5,695	5,156	2,418	13,269

* Operated by the Maryland Department of Game and Inland Fish.
 † Operated by the Maryland Department of Research and Education.
 ‡ Operated by the United States Fish and Wildlife Service.

TABLE II
METHOD OF RECOVERY (PERCENT) OF Banded WATERFOWL BY SPECIES

<i>How Recovered</i>	<i>L. Scaup</i>		<i>Redhead</i>		<i>Canvasback</i>	
	<i>No.</i>	<i>%</i>	<i>No.</i>	<i>%</i>	<i>No.</i>	<i>%</i>
Shot	413	91.9	411	96.5	230	95.1
Found Dead or Wounded	9	2.0	11	2.6	8	3.3
Banding Trap	1	0.2	-	--	2	0.8
Fish Net	22	4.8	1	0.2	1	0.4
Illegal Kill	4	0.9	1	0.2	1	0.4
Steel Trap	1	0.2	2	0.5	-	--
TOTAL	457	100.0	426	100.0	242	100.0

Band recoveries were reported from 33 states, six Canadian provinces and the Bahamas. Generally, most recoveries were reported from the central Canadian provinces, the north central plains states, those states bordering on the Great Lakes and the Atlantic coastal states from Maryland south to Florida (Table III). Although the majority of recoveries of the three species are from the above states, incidental recoveries of the redhead were reported from nearly all areas of the United States and Canada with the exception of New England. Canvasback recoveries were received in limited numbers from the northern areas of the west coast plus several of the central mountain states. With few exceptions (Mississippi flyway states) the lesser scaup was restricted to the groups of major recovery states mentioned previously.

It is worth noting here that Maryland recoveries accounted for 52 percent of all bands reported and that 14 of the major recovery states or provinces reported 93.3 percent of all bands recovered.

In order to obtain some idea of the chronology of the migration of these three species, an arbitrary grouping of major recovery states was made so that regional designations ranging from region I (Central Canadian provinces) southeasterly to region VI (Georgia-Florida) could be delineated. A tabulation of band recoveries by regions for half month periods (September through January) is presented in Table IV. As expected there is a rather clear progression of periods for regions as represented by maximum kill which may roughly indicate migration patterns. Region I shows its peak kill for two species (lesser scaup and redhead) during September while for the canvasback the peak is the

TABLE III
TOTAL RECOVERIES BY STATE FOR LESSER SCAUP, REDHEADS AND CANVASBACKS
BANDED IN MARYLAND, 1952-1957

U. S.	L. Scaup	Redhead	Canvasback	Total	Percent
Alabama	1	1	-	2	*
Arizona	-	1	-	1	*
Arkansas	-	1	-	1	*
California	-	1	-	1	*
Delaware	1	-	-	1	*
Florida	9	5	-	14	1.2%
Georgia	3	2	-	5	*
Idaho	-	-	1	1	*
Iowa	1	1	-	2	*
Illinois	4	1	1	6	*
Indiana	-	-	1	1	*
Kansas	-	1	-	1	*
Louisiana	3	1	-	4	*
Maryland	268	170	149	587	52.0%
Michigan	12	37	5	54	4.8%
Minnesota	12	57	22	91	8.1%
Missouri	1	1	-	2	*
Montana	-	-	1	1	*
Nevada	-	1	-	1	*
New Jersey	3	-	4	7	*
New York	2	6	4	12	1.1%
North Carolina	21	27	-	48	4.3%
North Dakota	4	6	11	21	1.9%
Ohio	7	4	-	11	*
Oklahoma	-	1	-	1	*
Pennsylvania	6	5	4	15	1.3%
South Carolina	1	1	-	2	*
South Dakota	1	8	5	14	1.2%
Texas	1	5	-	6	*
Utah	-	1	1	2	*
Virginia	49	14	5	68	6.0%
Washington	-	-	2	2	*
Wisconsin	6	17	12	35	3.1%
<i>Canada</i>					
Alberta	1	1	2	4	*
Manitoba	16	24	7	47	4.2%
N. W. T.	1	-	-	1	*
Ontario	18	13	3	34	3.0%
Quebec	2	4	-	6	*
Saskatchewan	2	8	2	12	1.1%
<i>Other</i>					
Bahamas	1	-	-	1	*
	<u>457</u>	<u>426</u>	<u>242</u>	<u>1,125</u>	<u>93.3%</u>

29 States, etc. 32 States, etc. 20 States, etc.

* Less than one percent.

Total * = 6.7%

first two weeks of October. For Region II the maximum kill for all species occurs in October with redheads and canvasbacks reaching a peak the first half of the month and lesser scaup the latter half. Region III has maximum kills in November with redheads and canvasbacks again showing peak kills the first half and lesser scaup the second. Region IV shows the widest variation with the greatest kill of canvasbacks occurring the latter part of October, that of redheads the first half of November and lesser scaup the latter half of November. Region V and VI show maximum kills for all three species during the first half of January except for canvasbacks which have not been recovered in Region VI. Since waterfowl hunting has ended not later than the middle of January for all practical purposes, tabulations were carried no further than this

TABLE IV
 CHRONOLOGICAL RECOVERY OF LESSER SCAUP, REDHEAD AND CANVASBACK BANDS
 1952-1957

Region*	September		October		November		December		Jan. 1-15	Total
	1-15	16-30	1-15	16-31	1-15	16-30	1-15	16-31		
<i>Lesser Scaup</i>										
I	-	6	4	3	1	1	-	-	-	15
II	-	-	3	9	5	-	-	-	-	17
III	-	-	2	2	2	4	1	-	-	11
IV	1	1	8	6	6	11	4	2	-	39
V	-	-	-	-	13	36	55	91	95	290
VI	-	-	-	-	-	1	2	1	6	10
										382
<i>Redhead</i>										
I	2	15	9	3	-	-	-	-	-	29
II	-	-	48	16	4	1	-	-	-	69
III	-	-	8	7	3	1	-	-	-	19
IV	-	-	6	16	18	15	1	1	-	57
V	-	-	-	-	6	32	42	50	63	193
VI	-	-	-	-	-	3	-	1	3	7
										374
<i>Canvasback</i>										
I	1	4	5	-	-	-	-	-	-	10
II	-	1	18	15	4	-	-	-	-	38
III	-	-	2	1	8	-	1	-	-	12
IV	-	-	-	3	2	2	3	-	-	10
V	-	-	-	-	5	17	32	31	46	131
VI	-	-	-	-	No Recoveries		-	-	-	-
										201

* Region I. Alberta, Saskatchewan, Manitoba. Region II. N. Dakota, S. Dakota, Minnesota. Region III. Wisconsin, Iowa, Illinois. Region IV. Ontario, Michigan, Ohio, Pennsylvania. Region V. Maryland, Virginia, N. Carolina, S. Carolina. Region VI. Georgia, Florida.

date. It should be emphasized that waterfowl migrations vary from year to year and that this tabulation represents the average condition during the period 1952-1957. Examination of this table indicates the redhead and canvasback show peak recoveries generally during the same period for the various regions while the lesser scaup appears to be a later migrant with peaks approximately half a month behind the redhead and canvasback. However, for Maryland and all coastal states south, maximum kills of all three species do not occur until the first half of January.

During this investigation the sex of all birds was determined with the exception of 24 scaup banded during 1952. However, both sex and age data were obtained only for those birds banded in the Eastern Bay and Patuxent River areas. Sex ratios of all three species showed a preponderance of males. The sex ratio of lesser scaup at banding was 84 percent males to 16 percent females while redheads had a ratio of only 60 percent males to 40 percent females. The canvasback sex ratio was intermediate with a ratio of 65 percent males to 35 percent females. When considering all recoveries, sex ratios of recovered birds were essentially identical to sex ratios at the time of banding for all three species. For those birds which were aged, both male and female lesser scaup and male redheads and canvasbacks showed a predominantly adult age ratio at banding. Only in the female redhead and female canvasback groups were more subadults than adults banded. This generally high adult ratio could be the result of several factors. It is probable that an unknown number of drakes hatched the spring previous to banding had already assumed adult physical characteristics and hence were classed as adults when banded. Secondly, Brakhaage (1953) in his analysis of mortalities of hand-reared versus wild-trapped waterfowl concluded that first year mortality rates for wild-trapped juvenile

redheads ran as high as 80 percent. Comparable mortality rates for hand-reared canvasbacks and redheads amounted to 93 and 94 percent respectively. Both these factors would tend to depress the juveniles in the age ratios.

TABLE V
SEX AND AGE RATIOS (PERCENT) AT BANDING AND OF FIRST YEAR RECOVERIES
FOR WATERFOWL Banded IN MARYLAND, 1952-1957 *

	Males		% Total Males	Females		% Total Females	Total	
	% Adult	% Subadult		% Adult	% Subadult		% Adult	% Subadult
<i>Lesser Scaup</i>								
Banded	83.3	16.7	84.1	63.2	36.8	15.9	80.1	19.9
Recovered	71.6	28.4	82.3	52.0	48.0	17.7	68.1	31.9
<i>Redhead</i>								
Banded	66.2	33.8	53.4	36.2	63.8	46.6	52.2	47.8
Recovered	75.0	25.0	60.4	28.6	71.4	39.6	56.6	43.4
<i>Canvasback</i>								
Banded	72.1	27.9	69.9	38.2	61.8	30.1	61.9	38.1
Recovered	57.0	43.0	72.5	13.3	86.7	27.5	45.0	55.0

* This includes only birds aged when banded and only birds shot or found dead.

TABLE VI
MORTALITY RATES FOR ADULT LESSER SCAUP, REDHEAD AND CANVASBACK

Interval from Banding (Year)	Birds Available	Number Recovered	Number	No. Alive at	Mortality Rate
			Recovered/1,000 Banded Bds. Available	Start of Each Age Interval Per 1,000 Band.	
<i>Lesser Scaup</i>					
0-1	5,695	272	48	127	37.8%
1-2	3,742	96	26	79	33.0%
2-3	2,671	55	20	53	37.7%
3-4	1,575	32	21	33	63.6%
4-5	170	2	12	12	100.0%
5-6	109	0	0	0	0.0%
			127	304	Avg. 41.8%
<i>Redhead</i>					
0-1	5,156	358	69	183	37.7%
1-2	1,122	53	48	114	42.1%
2-3	386	9	23	66	34.8%
3-4	139	5	36	43	83.7%
4-5	134	1	7	7	100.0%
5-6	1	0	0	0	0.0%
			183	413	Avg. 44.3%
<i>Canvasback</i>					
0-1	2,418	185	77	201	38.3%
1-2	1,325	44	34	124	27.4%
2-3	482	10	21	90	23.3%
3-4	48	1	21	69	30.4%
4-5	41	2	48	48	100.0%
5-6	29	0	0	0	0.0%
			201	532	Avg. 37.8%

In examining first year recoveries following banding it was found that a higher percentage of birds banded as subadults were recovered in comparison with the percentage of subadults banded with the exception of the male redhead group in which class the recovered percentage of adults exceeded the banded percentage. Consequently, it appears that lesser scaup and canvasback in their second year may still be more vulnerable than older birds.

Calculations of average annual adult mortality rates by methods given below indicated only small differences between the three species. The redhead was highest with an adult mortality rate of 44 percent per year. The lesser scaup had a rate of 42 percent and the canvasback 38 percent (Table VI). These adult mortality rates were calculated after the manner used by Hunt et al (1958) working with hand-reared mallards in Wisconsin. By using the method of Bellrose and Chase (1950) with the same data, similar results were obtained. Hickey (1952) reports adult mortality rates for redheads as ranging from 47 percent to 54 percent using two groups of birds and two methods of analysis. Brakhage (1953) reports first year mortality rates of 80 percent and 94 percent for wild-trapped and hand-reared juvenile redheads respectively but presents no adult mortality rates. His figures for first year mortality rates disclose that those of the canvasback apparently approximate those of redheads. Comparable records of adult mortality rates for the lesser scaup and canvasback were not found in the literature. However, using mortality rates calculated for redheads in this study it appears that these mortality rates were slightly lower for this group of birds than those recorded elsewhere.

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PLANNING FOR WILDLIFE ON WATERSHED PROJECTS

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Wildlife Management in reservoirs has been historically concerned with fish and wildlife resources as the result of developments by such public agencies as the Corps of Engineers, Bureau of Reclamation and TVA. With more recent interest in upstream flood prevention on farms in Soil Conservation Districts, we are now concerned—not with reservoirs of thousands of acres—but of those involving usually only 10 to 50 acres.

Three watershed programs are administered by the Soil Conservation Service. They are: (1) The Flood Control Act of 1944 involving 11 river basins; (2) The Pilot Watershed program involving 60 projects; and (3) Relatively small projects involving watersheds of less than 250,000 acres under the Watershed Protection and Flood Prevention Act authorized by Public Law 566, 1018, 85-624 and 85-865.

The problems of fish, waterfowl, upland game, furbearers, silt settlement, stream improvement, stabilization of streamflow, pollution control, and recreation are involved in part or in whole where watershed projects and flood control reservoirs are involved. Several species of wildlife are important, but fish and ducks receive the most attention.