

ZIMMER'S FLYCATCHER, *Myiodynastes maculatus difficilis* Zimmer.—♂ and ♀, the former with much enlarged gonads, Saboga, February 12.

PANAMA FLYCATCHER, *Myiarchus ferox panamensis* Lawrence.—2 ♀, La Vivienda, May 23.

BRAN-COLORED FLYCATCHER, *Myiophobus fasciatus furfurosus* (Thayer and Bangs).—♂, with enlarged gonads, La Vivienda, May 23.

SMOOTH FLYCATCHER, *Sublegatus glaber glaber* Sclater and Salvin.—♂, with enlarged gonads, La Vivienda, May 23.

SAN MIGUEL BANANAQUIT, *Coereba flaveola cerioclunis* Bangs.—♂ and ♀, both in breeding state, Saboga, February 12.

FLESH-LEGGED HONEY-CREEPER, *Cyanerpes cyaneus carneipes* (Sclater).—4 ♂, all with much enlarged gonads, Saboga, February 12.

PROTHONOTARY WARBLER, *Protonotaria citrea* (Boddaert).—♀, Pacheca, February 10.

PANAMA GOLDEN WARBLER, *Dendroica petechia aequatorialis* Sundevall.—3 ♂, Saboga, one February 12, the others May 25. Only one of the May birds had enlarged gonads.

BALTIMORE ORIOLE, *Icterus galbula* (Linnaeus).—♀ immature, Saboga, February 12.

NORTHERN BLUE TANAGER, *Thraupis episcopus diacona* (Lesson).—2 ♀, Pacheca, February 10; ♂, 2 ♀, Saboga, February 12, May 22 and 25; ♀, La Vivienda, May 23.

Two of the May birds had enlarged gonads.

PEARL ISLAND TANAGER, *Ramphocelus dimidiatus limatus* Bangs.—♂, with greatly enlarged gonads, Saboga, February 12.

PEARL ISLAND SALTATOR, *Saltator albicollis speratus* Bangs and Penard.—♂, Saboga, February 12.

American Museum of Natural History
New York, N. Y.

SEX RATIOS OF DUCKS IN SOUTHWESTERN WASHINGTON

BY JAMES R. BEER

THIS study of the sex ratios of ducks in southwestern Washington covers the periods of fall migration, winter residence, and spring migration. Due to the late date at which some of the ducks complete the molt to adult plumage, most of the data were obtained during the winter and spring periods.

The object of this survey is to determine the make-up of the populations of the various species that use this portion of the Pacific flyway. A qualitative survey of the duck populations is as important to the

management of the various species as the more frequent quantitative surveys.

Detailed information on the sex ratios is given by the months in Table 1.

METHOD OF MAKING COUNTS

The counts were made of the various species as early in the season as possible. The limiting factors in the determination of the sex of waterfowl were the completion of the post-nuptial molt of the adult males, and the change of the immature males from juvenal plumage to adult plumage complete enough for field identification. These vary greatly with the different species. To obtain records of sufficiently large numbers of birds, it was found that field identification of the live birds was the only method that gave satisfactory results.

Much of the work was carried on from a small boat propelled by oars, as it was more satisfactory to approach the birds by this method than by using a motor. Nearly all of the fall and winter observations were made by this method, although the spring observations were mainly from shore. During the spring, the ducks spent most of their time along the shores of the large bodies of water and on the smaller ponds, while in the fall and winter they were found mainly on the larger lakes and the Columbia River. This was due to the lack of water in the small pond areas during winter and the effect of hunting pressure.

Several methods of making the counts were tried. These included counting hunters' bags and making field observations. Counting hunters' bags was found not to be practical as the day's bag would not agree with field observations. Then, too, the number of the birds counted by this method did not justify the time spent. The field observations were made either alone or with two people working together. When working alone, it was found that one must count all of each sex separately and then recount the entire flock. When two people worked together, one observed and called out the sex and species while the other tallied the results. Not only were these results more accurate, but the number of counts per man hour were greatly increased.

When one has to count each sex separately it is nearly impossible to count birds in flight or when there is any movement in the flock. A small flock leaving or arriving will make the previous counts useless. It is much simpler to count large rafts of mixed species by counting everything, starting at one end of the raft and counting straight through to the other end. As an individual flock or raft is usually

TABLE I
SEX RATIOS OF 15 SPECIES OF DUCKS BY MONTHS
1943-1944

SPECIES	SEPTEMBER		OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH		APRIL		TOTAL	
	TOTAL	RATIO ♂/♀	TOTAL	RATIO ♂/♀	TOTAL	RATIO ♂/♀	TOTAL	RATIO ♂/♀	TOTAL	RATIO ♂/♀	TOTAL	RATIO ♂/♀	TOTAL	RATIO ♂/♀	TOTAL	RATIO ♂/♀	TOTAL	RATIO ♂/♀
MALLARD	26	1.00-1	38	2.00-1	179	1.32-1	238	1.00-1	713	1.04-1	202	0.91-1	226	0.92-1	90	1.14-1	1652	1.02-1
GADWALL	0	f	0	0	9	1.22-1	0	0	0	0	18	1.00-1	0	0	0	0	27	1.08-1
BALDPATE	0		3	0.50-1	12	1.00-1	90	1.20-1	602	1.05-1	1138	1.21-1	3027	1.14-1	127	1.15-1	4999	1.14-1
PINTAIL	0		17	1.12-1	20	1.50-1	37	1.31-1	224	1.11-1	307	1.05-1	17	0.89-1	0	0	622	1.09-1
GREEN-WINGED TEAL	0		9	0.80-1	18	1.00-1	32	1.00-1	84	1.16-1	247	0.99-1	229	1.02-1	26	1.00-1	645	1.02-1
SHOVELLER	0		0	0	0	0	22	0.86-1	0	1.29-1	32	1.29-1	6	1.00-1	2	1.00-1	101	1.15-1
WOOD DUCK	0		0	0	0	0	0	0	0	0	0	0	32	1.12-1	29	1.22-1	61	1.18-1
ANATINAE	26	1.00-1	67	0.97-1	238	1.29-1	419	1.02-1	1662	1.06-1	1944	1.12-1	3537	1.12-1	214	1.14-1	8107	1.11-1
REDHEAD	0		0	0	2	2.00-0	5	1.50-1	4	1.00-1	4	1.00-1	0	0	0	0	15	1.50-1
CANVAS-BACK	0		0	0.00-1	2	1.00-1	0	0	74	1.96-1	193	2.51-1	46	1.30-1	0	0	316	2.10-1
LESSER SCAUP	0		1	0.00-1	0	0	41	1.28-1	10	1.00-1	161	1.24-1	659	1.56-1	40	1.86-1	911	1.49-1
AMERICAN GOLDEN-EYE	0		0	0	7	7.00-0	0	0	0	0	7	0.75-1	0	0	0	0	14	2.50-1
BUFFLE-HEAD	0		0	0	7	0.72-1	1	1.00-0	0	0	0	0	0	0	8	0.60-1	16	0.78-1
NYROCINAE	0		1	0.00-1	18	2.32-1	47	1.35-1	88	1.75-1	365	1.74-1	705	1.55-1	48	1.52-1	1272	1.61-1
AMERICAN MERGANSER	0		5	4.00-1	35	1.69-1	315	1.39-1	309	1.69-1	95	0.86-1	7	0.00-7	7	0.17-1	773	1.38-1
RED-BREASTED MERGANSER	0		0	0	0	0	0	0	0	0	0	0	17	1.42-1	0	0	17	1.42-1
MERGINAE	0		5	4.00-1	35	1.69-1	315	1.39-1	309	1.69-1	95	0.86-1	24	0.71-1	7	0.17-1	790	1.38-1
RUDDY DUCK	0		0	0	0	0	0	0	8	3.00-1	1	0.00-1	0	0	2	1.00-1	11	1.75-1
ERISMATURINAE	0		0	0	0	0	0	0	8	3.00-1	1	0.00-1	0	0	2	1.00-1	11	1.75-1
ANATIDAE	26	1.00-1	73	1.02-1	291	1.38-1	781	1.19-1	2067	1.17-1	2105	1.18-1	4266	1.17-1	271	1.15-1	10180	1.18-1

of an even composition as to sex, the data obtained from counting a portion of the flock are good. Often a raft will break up before a complete count is possible.

AREA STUDIED

The area studied is limited to a strip along the Columbia River from White Salmon, Klickitat County, Washington, to Ridgefield, Clark County, Washington. All but one day's observations were from the northern side of the Columbia River.

Most of the winter observations were made on Vancouver Lake, a lake with an area of about five square miles in Clark County, Washington. After the middle of February, the ducks were found to be on the smaller ponds and sloughs. This change was probably due to the birds going back to their preferred habitats after the closing of the hunting season. The winter was very mild and after this date no ice was formed on these smaller ponds. It was in this general area that the majority of the Anatinae and Merginae were observed. Most of the Nyrociniae were observed on the Columbia River where the water was deeper.

WEATHER CONDITIONS

Weather conditions affect the local movements of waterfowl in this area. As this winter (1943-1944) was mild, the larger lakes and all of the streams were open throughout the winter. Also, the winter rainfall was below normal, but not to the extent of appreciably lowering the quantity of open water used by the ducks. Due to the mild weather, many thousands of ducks remained in the area throughout the winter. Large flocks of Canada Geese and a few snow geese also wintered here this year.

The variation in the sex ratios of the ducks during the progress of the migration was noted only in a few cases. There was little or no clumping of the sexes due to the changes of temperature. The ratios remained the same throughout the winter period and both early and late migratory periods for most species.

After the middle of February, any series of two or three warm days would send another flow of ducks into the north. This locality is apparently off the regular route taken by certain species such as the Pintail and Shoveller.

DISCUSSION

Mallard, *Anas platyrhynchos*.—The Mallard is one of the most common winter ducks, as well as the main breeding species for this area. It is common at all times of the year though more numerous during

the winter months. Counts for this species were started early in the fall before the migrants from the north arrived. During this period the sex ratio of males to females ran 1.00 to 1. With the arrival of the birds from the north there was a slight rise in the number of males in proportion to the females. After the wintering birds had left for the north it was found that the ratio was slightly high in favor of the hens. This agrees with counts of the hunters' bags in that more drakes than females were killed. Due to the lack of predators in this area it is doubtful if many nesting females are killed. The excess of males in the wintering ducks is probably due to conditions on the breeding grounds.

The ratio as a whole is very evenly balanced. For the total of 1,652 birds observed the ratio was 1.03 to 1. The last observations, during the middle of April, showed a slight increase in males, but this was more apparent than real, as some of the females had begun to take up nesting activities.

Gadwall, *Chaulelasmus streperus*.—Very few Gadwalls were seen during this study. There were only 27 individuals identified to sex with a ratio of 1.08 to 1. When compared with other species of similar habits, it seems that this ratio is quite representative.

Baldpate, *Mareca americana*.—This is one of our most prominent winter and spring residents. It is found in large flocks in most of the lowland areas where its habit of grazing makes it quite conspicuous. Of the 4,999 Baldpates sexed, 2,667 were males and 2,332 were females which gives a ratio of 1.14 to 1. It is interesting to note that individual flocks of about 500 individuals would vary greatly in sex ratios. This variation ran from as high as 1.26 to 1 to as low as 1.08 to 1. In the smaller flocks the ratios varied a little more. The variation is greater in this species than with the others in its subfamily.

There was very little over-all variation in the ratios of the Baldpates until the last of the migration during the first part of April. At this time the mated birds tended to be among the first to migrate, leaving a small number of unmated birds; this gave a slightly higher ratio in favor of the males—a ratio of 1.24 to 1. The small number of birds seen during this late spring period did not affect the over-all ratio of 1.14 to 1.

American Pintail, *Anas acuta tzitzihoa*.—The Pintail is one of the common spring and fall ducks. While it is to be found throughout the winter, its numbers are greatly reduced during the colder weather. Six hundred and twenty-two Pintails were counted, 325 males to 297 females, which gives a ratio of 1.09 to 1. The ratio varied as the

season changed. During the fall and winter periods the ratio was 1.10 to 1, while during the last of the season the ratio became as low as 0.89 to 1. Due to the small number of birds in the area during the last spring period, the ratio of 1.10 to 1 should be taken as the nearest to the true ratio for this species.

Green-winged Teal, *Anas carolinensis*.—This small duck was very abundant during the entire study, but only 645 birds were determined as to sex. The erratic flight made positive identification of sex very difficult. Of those identified, 326 were males and 319 females, or a ratio of 1.02 to 1. In this species the sex ratio remained quite constant throughout the period of study. The ratio of 1.02 to 1 is one of the most even found, being slightly more even than that of the Mallard.

Shoveller, *Spatula clypeata*.—One hundred and one Shovellers, 54 males and 47 females, were counted to give an over-all ratio of 1.15 to 1 for the year. The first counts were made during the last of December when the males were far enough along in their molt to assure accurate counts. The ratios were fairly constant throughout the winter, but during March and April only occasional mated pairs were seen.

Wood Duck, *Aix sponsa*.—Observations of the Wood Duck were made only during the spring period; the earliest observations were on March 12. The lack of previous observations is not accounted for as this duck is known to be found in this area throughout the year. Thirty-three males and 28 females, a total of 61, were checked, giving a ratio of 1.18 to 1. At no time were more than four or five Wood Ducks seen together. They were among the wildest of the ducks observed even though they were in active courtship performance during most of these observations.

Redhead, *Nyroca americana*.—Few birds of this species were seen during the period of this study. Fifteen individuals, nine males and six females, were observed, giving a ratio of 1.50 to 1. This indicates a tendency toward an excess of males, though the number of birds observed was too small for definite conclusions.

Canvas-back, *Nyroca valisineria*.—The presence of the Canvas-back in this area was sporadic. The flocks seemed to be quite nomadic in habit and were seldom found in the same area during any two consecutive observations. In all, 316 individuals were sexed, 214 males and 102 females, for a ratio of 2.10 to 1. It was found that the ratio was more unbalanced in the large flocks than in the smaller groups. There was also a tendency for the winter groups to have a higher proportion of males than the spring groups. This indicates that the males migrate earlier than the females. These birds were found on

both the shallow ponds and the deep water of the Columbia River. The ratio in this species is the most unbalanced of any of the common ducks in this area.

Lesser Scaup Duck, *Nyroca affinis*.—The Lesser Scaup Duck is the most common of the diving ducks in this area. It was found primarily on the Columbia River. Totals of 911 individuals, 545 males and 366 females, were observed. The sex ratio for the entire group was 1.49 to 1. While individual flocks varied considerably in sex ratio, very little variation was found during the progress of the season.

American Golden-eye, *Glaucionetta clangula americana*.—Only two small flocks of the American Golden-eye were seen. Totals of 14 birds, 10 males and 4 females, were observed, which gives a ratio of 2.50 to 1. This indicates that there is an excess of males though the true ratio may vary considerably from this figure.

Buffle-head, *Charitonetta albeola*.—The Buffle-head was not a common duck in this area. Only 16 individuals were determined as to sex. The ratio was 0.78 to 1, but it is felt that this may not be representative.

American Merganser, *Mergus merganser americanus*.—The American Merganser was the only species in which there was a noticeable separation of the sexes. The sexes were found in more or less pure flocks. While no definite rule can be stated as to the composition of the various flocks, the typical flock consists of about seven males and one female or four or five females either alone or with a single male. On occasion, flocks of quite even sex distribution are seen. Not only were the sexes found separately but the type of water occupied and the migratory movements were different.

For the entire period of study, 773 birds, 448 males and 325 females, were observed in a ratio of 1.38 to 1. From field observations it is felt that this ratio is not correct. The females are far less nomadic than the males and tend to inhabit the comparatively quiet waters of the larger lakes and sloughs while the males tend to stay in the swift waters of the rivers. With the coming of spells of cold weather the males join the females on the larger lakes. It is probable that the ratio of 1.55 to 1 that was derived from the winter observations is nearly correct.

About the first of February, the males started for their nesting territories, and by the 10th of March one seldom saw a male American Merganser even though the females were commonly seen as late as the last of March.

During the colder weather, large rafts of American Mergansers were found well out on the larger lakes, swimming around and resting on

the ice floes. While these large rafts were composed of mixed sexes, basically they were composed of small groups of 3 to 25 individuals, mainly of a single sex.

Red-breasted Merganser, *Mergus serrator*.—Only 17 of these mergansers were seen. The ten males and seven females give a ratio of 1.43 to 1. When compared with the American Merganser, it appears probable that this ratio is fairly representative.

Ruddy Duck, *Erismatura jamaicensis rubida*.—Seven males and four females were seen, giving a ratio of 1.75 to 1. These ducks were very difficult to sex except on clear, bright days.

CONCLUSIONS

It was found that, as a whole, the puddle ducks have a quite even sex ratio. The Wood Duck and Baldpate deviate from this pattern to some extent. The diving ducks and mergansers were found to have comparable sex ratios. These ratios were usually considerably higher in favor of the males than that found in the puddle ducks.

From field observations and a number of hunters' bags observed, it would seem that during the fall and winter more males than females are killed. This would not necessarily mean that the male is more vulnerable than the female but rather that the males are more abundant. The exception to this seems to be the Mallard where the fall ratio is quite even while the spring ratio favors the females in the local breeding birds.

Where the ratio is unbalanced in favor of the males, it will be necessary to go to the nesting and molting areas to determine the cause. Nothing indicating the cause of this difference was noted during the present study.

SUMMARY

During the fall, winter, and spring observations of 1943 and 1944, 10,180 ducks of 15 species were counted as to sex. For this entire group it was found that there was a sex differential in favor of the males. The ratio was found to be 1.18 to 1.

As a general rule, there was little difference in the sex ratios during the changes of season and only a slight tendency for the males to leave the wintering areas first.

The Anatinae were found to have quite an even sex ratio while the Nyrociniae and Merginae were unbalanced in favor of the males.

Vancouver

Washington