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Spring Wood Duck Population of Mississippi River Pool 10¹

DALE HEIN²

Abstract: The wood duck (*Aix sponsa* L.) populations of Mississippi River Pool 10 were studied during the springs of 1960-1964. The major nesting areas were found along the lower 3 miles of tributary valleys and on oak-covered bluffs. Only 35% of the pairs associated with Pool 10 nested in the 50 square miles of bottomlands. Distribution of pairs among habitat types was similar for 480 pairs in 1962 as was true for 530 pairs in 1963. Morning and evening flight counts and pair counts on sample transects were used to estimate numbers. Migration, sex ratios, nesting activities, local movements and population fluctuations were also observed.

INTRODUCTION

The wood duck (*Aix sponsa* L.) population of Mississippi River Pool 10 was studied to ascertain numbers of nesting pairs. Other objectives were to determine distribution of the nesting population in relation to habitat types, to study year-to-year fluctuations in distribution and abundance, and to observe local movements on the breeding grounds.

Field work extended from mid-March to June, 1962 and 1963, covering time of arrival of first spring migrants to hatching of early broods. In April, 1960, 1961 and 1964, several days were spent counting wood ducks on key sample areas. Refuge Manager Don Gray and members of his staff on the Upper Mississippi River Wildlife and Fish Refuge generously assisted in collecting certain census data.

THE STUDY AREA

Pool 10 extends 35 miles upstream from Dam 10 at Guttenburg, Iowa to Dam 9 at Lynxville, Wisconsin. Water levels are relatively stable due to the 9-foot navigation channel maintained by the Corps of Engineers. The upper fourth of Pool 10 consists of wooded islands and narrow sloughs much as existed prior to impoundment. Extensive marshes comprise the middle half of the pool, while open water areas with fewer islands and marshes predominate in the lower fourth of the pool. Limestone bluffs rise up to 600 feet above the bottomlands on each side of

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the flood plain with 1 to 3 miles between the bluffs. Most of the bottomland wood duck habitat is part of the Upper Mississippi Refuge managed by the U.S. Bureau of Sport Fisheries and Wildlife.

Dominant vegetation on the bluffs is oak (*Quercus alba* and *Q. macrocarpa*) and hickory (*Carya ovata*), while the flood plain is dominated by associations of elm (*Ulmus americana* and *U. fulva*), ash (*Fraxinus* spp.), box elder (*Acer negundo*), maple (*Acer* spp.), and willow (*Salix* spp.). In the marshes, emergent vegetation has encroached on open water areas in recent years, with arrowhead (*Sagittaria latifolia*), lotus (*Nelumbo lutea*), smartweed (*Polygonum* spp.), and river bulrush (*Scirpus fluviatilis*) especially abundant. Typical submergents are coontail (*Ceratophyllum demersum*) and pondweeds (*Potamogeton* spp.). Duckweed (*Lemna* spp.) forms extensive floating mats during summer.

Wood ducks find nearly ideal habitat in Pool 10. Mature timber on the bluffs and in the bottoms provides numerous cavities for nesting. Quiet sloughs and secluded swamps serve as brood-rearing areas, and abundant aquatic vegetation, acorns and waste corn in nearby fields provide ample food. Eleven tributaries are important extensions of habitat used by many wood ducks from Pool 10 for nesting, loafing and feeding sites as far as 5 miles from the Mississippi.

METHODS

Observations were made each day from 40 minutes before sunrise until flight activity between roosting sites and nesting and feeding areas ceased about 1 hour after sunrise. The evening feeding and roosting flights were also observed from about 1 hour before sunset until dark. Midday was usually given to general reconnaissance of areas frequented by "woodies", or counts were made from a canoe along sample transects. Related observations were made on feeding activity, flock size, sex ratios, daily movements, and nesting activities.

Estimating the breeding population in 50 square miles of bottomland habitat of Pool 10 was a major project each year. From mid-April to mid-May, 17 transects totaling 33 miles in length were checked from a canoe. Wood duck pairs were counted within 100 yards of the line of travel, which made the transect approximately one-eighth-mile wide. Transects were often run more than once. Minor adjustments based on other observations were sometimes made in estimates of breeding population generated from transect sample data.

Most wood ducks roosted at night at scattered locations in the bottoms, but many chose nesting sites on the bluffs or in

tributary valleys. Nesting populations on tributaries were checked by making early morning and evening counts at mouths of streams during mid-April, when many hens left the bottoms each morning to engage in cavity searching or egg laying before returning to the Mississippi each evening to roost. On eight minor tributaries these flight counts were virtually a census. On three major tributaries, navigable with a canoe, flight counts were supplemented by float counts.

Numbers nesting on the 60 miles of bluff faces and in the hollows of 20 intermittent watercourses were estimated by watching for morning and evening flights on random samples of 10% of the bluffs and 35% of the hollows and ravines.

NESTING SEASON

Wood duck migration was 1 week earlier in 1963 than in 1962. Along the Mississippi River, wood ducks moved north as rapidly as tributaries became ice-free. In Pool 10, woodies were first seen on March 19, 1963, on lower Yellow River where the ice went out on March 16; the Mississippi remained ice-covered until March 24. Early-arriving wood ducks were in flocks of 10 to 20, which broke into pairs within a day. Little courting activity was observed since all hens had formed pair bonds prior to arrival. By mid-April the resident population was complete.

Hens were seen examining cavities on March 25, and in early April three nests were checked that contained clutches that had been started in the last week of March—an unusually early laying date. By May, most hens were incubating, and the first brood was seen on May 15, exactly 2 weeks earlier than in 1962. Incubating hens usually left the nest by midmorning and flew to the nearest water to feed. Hens returned after 10 to 60 minutes, usually accompanied by the drake, which then flew back to a favorite waiting and loafing site. Drakes remained attentive to their hens until incubation was well underway. Later they gathered into flocks of up to 30 prior to the post nuptial moult. No behavior interpreted as territorial defense was seen. Drakes often shared logs along streams as loafing sites while waiting for their hens on a nest. Nesting observations generally agreed with those of Leopold (1951) at Burlington, Iowa.

During April most pairs roosted in the Mississippi River bottoms, but by May many hens were incubating and no longer returned to roost sites in the bottoms. Thus, counts at mouths of tributaries became unpredictable as flights between roosting and nesting areas became irregular and ceased (Fig. 1).

Chronology of nesting season and the earlier nesting in 1963

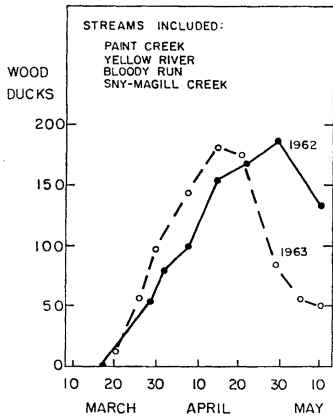


Fig. 1. Composite curves of wood duck flight counts made at mouths of four Mississippi River Pool 10 tributaries during spring, 1962-1963.

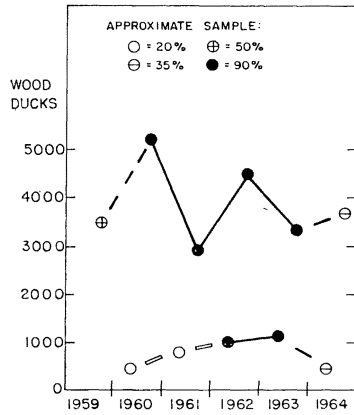


Fig. 2. Spring and fall estimates of wood ducks associated with Mississippi River Pool 10.

were reflected in observed sex ratios (Table 1). Sex ratio of the resident population was estimated to be between 110 and 128 males per 100 females. The first figure was based on March observations prior to significant nesting activity. However, unmated males may have tended to arrive later, which supported the higher figure.

Table 1. Sex ratios of wood ducks observed on Mississippi River Pool 10 and adjacent areas during Spring, 1962-1963

Observation	Year	March 15-31	April 1-15	April 16-30	May 1-15	May 16-31
Number classified ¹	1962:	338	954	596	422	271
	1963:	136	147	206	122	210
Males per 100 females	1962:	110	128	170	160	160
	1963:	113	127	145	160	200
Per cent pairs	1962:	95	88	69	65	53
	1963:	92	84	65	49	40
Per cent unattached males	1962:	5	12	28	29	36
	1963:	7	14	27	38	44
Per cent unattached females	1962:	0	0	3	6	11
	1963:	1	2	8	13	16

¹ Observations are included only if sex of every member of the flock was ascertained.

In 1962, during late May, 24 wood duck nest boxes of various designs and unknown history were checked in Pool 10. A hen was flushed from one, wood duck down (but no eggs) was found in another, a screech owl (*Otus asio*) inhabited one, and 21 were vacant. This low use was expected since mature trees with natural cavities were abundant.

ABUNDANCE AND DISTRIBUTION

Estimates of 480 pairs in 1962 and 530 pairs in 1963 indicated that Pool 10 supported about 12 to 15 pairs per mile of main

channel of the river. Estimates for 1960, 1961 and 1964 were lower and less reliable. When spring estimates were compared with fall population estimates, based primarily on counts made in mid-September at fall roosts as described by Hein (1962), spring and fall numbers were apparently independent. Thus, neither increases nor decreases from one fall to the next were consistently preceded or followed by decreases or increases from one spring to the next (Fig. 2).

Distribution of nesting was similar in both years, with 65% of the pairs nesting off the refuge. Fewer than 10 pairs, that normally spent part of each day on Pool 10, nested farther than 5 miles from the refuge. However, about 150 pairs nested each spring along a 20-mile segment of Wisconsin River from 5 miles above its confluence with the Mississippi to Boxcobel, Wisconsin. These birds were disassociated from Pool 10, but broods from there may have moved to the Mississippi in summer.

The lower 6 miles of Paint Creek, Allamakee County, Iowa, and adjacent swamps were selected for intensive study. The area was checked almost daily during May 12-31, 1963. Canoe float trips downstream and walking the stream banks back upstream were often repeated several times daily. About 40 pairs nested along lower Paint Creek, a high nesting density in less than 3 square miles of habitat. There was an apparent downstream movement of class Ia (less than 1 week old) broods; however, no broods were marked for positive determination of movements.

Similar distribution of pairs was noted in 1962 and 1963 among the four major habitats; i.e., Mississippi River bottoms, major tributaries, minor tributaries, and intermittent watercourses and bluff faces (Table 2). A contingency table, with Chi-square serving as an index of dispersion, showed no significant difference between years in distribution of pairs. Chi-square equalled 1.60 with 3 degrees of freedom; probability of a higher value due to sampling error equalled 0.66.

DISCUSSION

Estimates of spring populations in 1962 and 1963 were believed accurate within 10%. Rechecking sample areas and repeating flight counts on consecutive days gave coefficients of variation between 4 and 15%. Estimates for other springs were less reliable.

Pool 10 was one of the best large blocks of wood duck habitat in the Upper Mississippi River region. Although 1,100 woodies were present in April, 1963, on this 35-mile segment of the river, carrying capacity of the pool was probably much higher. Morf (1942) estimated that 2,000 wood ducks nested along 40 miles

Table 2. Estimated nesting population of wood ducks associated with Mississippi River Pool 10 in 1962 and 1963

Habitat type	Wood duck pairs	
	1962	1963
Major tributaries		
Paint Creek	45	40
Yellow River	40	55
Wisconsin River (lower 5 miles)	50	45
Subtotal—major tributaries	(135)	(140)
Minor tributaries		
First creek south of west end of Dam 9	16	13
Du Charme Creek	4	15
Picatee Creek	4	9
Bloody Run	6	11
Sny-Magill Creek	20	22
Sandy Creek	11	12
Chase Creek	5	4
Buck Creek	14	14
Subtotal—minor tributaries	(80)	(100)
Intermittent watercourses—30% sample of 20	60	40
Bluff faces—10% sample of 60 miles	40	70
Total nesting off the refuge (Pool 10)	315	340
Mississippi River Bottoms—49 square miles	165	190
Grand total nesting population	480	530

of river between Sabula and Dubuque, Iowa, habitat similar in size and of no better quality than Pool 10.

Highest density of nesting occurred along the lower 3 miles of tributaries, where meanders and oxbow swamps were often nearby and where turbulence and velocity of streamflow were markedly lower than farther upstream. Early migrants may have been attracted to these tributary valleys for nesting because they were ice-free earlier than the Mississippi.

The decrease in estimated nesting population in 1964 was characteristic of reduced numbers of wood ducks reported by the staff of the Upper Mississippi Refuge along 150 miles of river bordering northeast Iowa. Cause for the decrease might have been a heavy hunting kill the previous fall which had an earlier season and larger bag limit than were typical in recent years.

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