10 YEARS OF DEER MANAGEMENT ON WHITE RIVER NATIONAL WILDLIFE REFUGE

By

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ABSTRACT

When the 113.000 acre White Rive National Wildlife Refuge was established on September 5, 1935, very few white-tailed deer (*Odocoileus virginianus*) were present. With protection, the deer herd increased and by 1947 deer were firmly established. By 1957, the bottomland area was overstocked and browsing and desirable forest reproduction was heavy. Overpopulation continued until public hunts began in 1961. Due to obvious overpopulation, the number of hunters were unrestricted from 1961 through 1964.

Beginning in 1965, controlled hunting was initiated to achieve deer herd management on a sustained yield basis. The purpose of this study was to determine age and sex composition of the deer herd, proper number of hunters needed to harvest the annual increment and what affects either sex hunting had on reproduction and deer weights.

From 1961 through 1970 hunters removed a total of 16,709 deer. Hunting privileges have been granted to 69,770 individuals and approximately 125.000 hunter use days were estimated. Hunter success, excluding the bucks only hunt of 1964, varied from 43% in 1961 to a low of 15% in 1967. Hunter success based on number of individuals participating averaged 22%.

One hunter per 15 acres appears to be the concentration needed to harvest one deer per 75 acres of hunting area. This concentration of hunters yielded an abstract annual harvest of 35% of the deer population.

White River National Refuge was established in 1935 primarily for the benefit of migrating and wintering waterfowl. Very few deer existed on the refuge at that time. With protection, the deer herd increased and by 1947 deer were established throughout the refuge and had begun to spread onto private lands. By 1957, the population had increased to alarming number. A program of managed public hunting coupled with an intensive timber management plan was initiated to bring the deer population and its habitat into balance. This report documents the success of the first 10 years of this program. It is hoped that some of the results reported here can be applied to other deer herds throughout the southeast.

We gratefully thank the people who helped collect the data over the years. The late Sumner A. Dow was especially instrumental in initiating the data collections. Employees of the Fish and Wildlife Service, Arkansas Game and Fish Commission and students from Arkansas Polytechnic College manned the check stations and did the bloody work. Also, we especially thank Robert L. Downing for the reconstruction work and for reviewing the manuscript.

Background

The 113,000 acre Refuge varies from three to ten miles in width and is located along both sides of White River 60 miles north of the White's confluence with the Mississippi River (Figure 1). The refuge is comprised of 100,000 acres of bottomland hardwoods, 7,000 acres of water, 1,200 acres of farmland and the remainder is various administrative sites. As much as 80% of the forested area is subject to annual flooding during March, April and May. The alluvial soils found here are perhaps the most fertile in the state.

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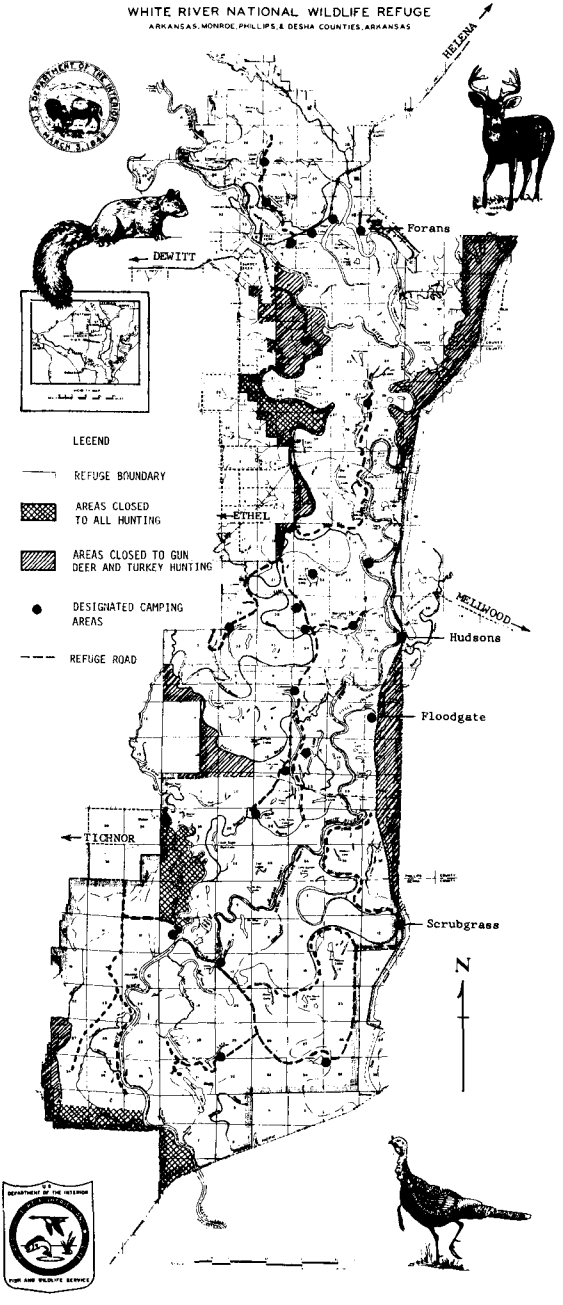
WHITE RIVER NATIONAL WILDLIFE REFUGE
ARKANSAS, MONROE, PHILLIPS, & DESHA COUNTIES, ARKANSAS
HELENA
Forans
DEWITT
LEGEND
REFUGE BOUNDARY
AREAS CLOSED TO ALL HUNTING
AREAS CLOSED TO GUN DEER AND TURKEY HUNTING
DESIGNATED CAMPING AREAS
REFUGE ROAD
ETHEL
MELLWOOD
Hudsons
Floodgate
TICHNOR
Scrubgrass
N

Habitat conditions for deer were excellent from 1937 to 1950. All refuge lands had been cut over by logging contractors and some timber reservations were not completed until 1941. By 1950 the forested area had grown tremendously and a closed canopy had developed. Deer food surveys in 1958 indicated less than 300 pounds per acre (Watson, Pers. Comm., 1971). Watson reports that at that time deer were destroying 87% of the timber production and that browsing on secondary deer foods indicated overpopulation. During high water periods in 1959-60-61, hundreds of deer were killed by local farmers in adjacent private fields to protect their crops. The Refuge farm unit, established for feeding a diminishing Canada goose flock, was literally overrun with deer which consumed over 50% of the crops.

Management Objectives

It was obvious by 1958 that deer management on this waterfowl refuge had become an unavoidable reality. An intensive multi-purpose timber management plan coupled with a program of managed public hunting was designed to bring the deer population and their habitat into balance. The timber management plan was to convert the over mature, closed canopy forest, with little understory browse, to an open, ullti-storied, productive forest. Between 1960 and 1970, forest cutting on 72,004 acres of the refuge yielded 110,265,120 board feet of lumber (Table 1).

Necessarily, because of the "refuge" concept and pressure from hunting clubs on the border of the refuge, public hunting as a management tool was harder to initiate. Gun hunting, designed to reduce the herd below carrying capacity and subsequently to harvest the annual increment, was begun in 1961.

Table 1. Timber harvest data from White River N.W.R. 1961-1970

Year	Acres	Board Feet
1961	1,160	2,622,725
1962	1,942	3,948,498
1963	5,462	5,291.028
1964	6,579	8,045,323
1965	6,159	9,875,946
1966	9,578	16,016,047
1967	9,189	17,103.852
1968	11,690	17,470.701
1969	10,426	17,395,000
1970	9,919	12,496,000
TOTAL	72,004	110,265,120

Results of Hunting

In November 1961, the first gun deer hunt was conducted. During this three day period, 1,726 (760 bucks, 966 does) were checked out at refuge check stations. The fact that this was the first either sex hunt in this area of the State, combined with the dense deer population, is believed to have caused an abnormally high hunter success. This success resulted in a large number of deer being killed and left when the hunter had an opportunity to take a larger deer. The total kill was estimated at 2,244 by 5,000 hunters during a total of 10,300 hunter days (Table 2).

Numbers of hunters were unlimited in hunts conducted in 1962 and 1963. During these two years a total of 5,866 deer were checked out at refuge check stations. In 1964, a bucks only hunt was conducted that lasted two days, and 295 deer were checked out. Refuge biologists estimated that 300 dead deer were left in the woods.

Following the 1964 hunt it was obvious that the refuge deer population had been reduced below the carrying capacity. In the meantime, timber management had greatly increased the food for deer. Browse surveys in 1964 indicated over 300 pounds of browse per acre in areas that had undergone timber management (Watson, pers, comm. 1971). It was necessary to begin controlled hunting to allow the herd to increase as well as to provide for the safety of the hunters.

These controlled hunts were conducted from 1965 through 1971. All hunts during this period were either sex and all except 1965 were two day hunts (Table 2).

Hunter use and Success

As Table 2 indicates, the number of hunters and their success varied. A factor affecting this variation is that refuge personnel have tried to adjust the number of permits in order to affect the percent kill desired. Also, weather and ground cover due to timber management had varying effects on hunter success. The number of acres of deer habitat per hunter and per deer killed is a revealing statistic useful to managers seeking more realistic deer hunting regulations. Numbers of deer killed per acre has fluctuated from an estimated one per 30 acres in 1962 to one per 141 acres in 1965 (Table 3).

Table 2. Hunter Use-deer kill data from White River N.W.R. 1961-70

Year	%Refuge Open	Permits	Est. Hunter Use Days	No. deer killed*	%Hunter Success
1961	89	6003	10,300	2240	43
1962	97	12086	27,193	4080	28
1963	75	1200	22,000	2960	21
1964	86	1000	15,400	600	3
1965	85	2591	4,690	560	21
1966	92	5839	11,000	1449	26
1967	75	6592	10,650	1193	15
1968	90	4000	7,200	1308	33
1969	90	5433	9,100	1440	28
1970	90	5226	7,250	875	22

Table 3. Acres of Deer Habitat per Hunter and per Deer killed on White River N.W.R., 1965-70.

Year	Acres/Hunter	Acres/Deer Kill
1965	54	151
1966	16	63
1967	15	71
1968	25	77
1969	19	63
1970	24	102

Biological Data

Beginning in 1965, biological data were collected on as many deer as possible from all parts of the refuge. The following results are based on these check station samples. It is important to remember that over 10,000 deer had been harvested from the refuge in the four years preceding the collection of biological data and that the herd has been reduced to below carrying capacity.

Field-Dressed Weights of Deer

During the six years, 1965-1970, field dressed weight data were recorded for 4,192 deer - 583 doe fawns, 594 buck fawns, 1,828 mature does, and 1,187 mature bucks, (Table 4). Weights of bucks in the 2½ years age class, the only age class of either sex to show a definite weight trend, increased during the period. Weights of both sexes increased with age; does attained heaviest weight at 2½ years, whereas, bucks seemed to grow steadily until their 4th year.

Age and Sex Ratios

Since 1965, 6,438 deer have been aged using the tooth replacement and wear techinque (Severinghaus, 1949). Figure 2 illustrates the distribution of age and sex data from the hunts of 1965 through 1970, and table 5 gives a reconstruction of the pre-hunt population using the method described by Downing, et, al. (unpublished).

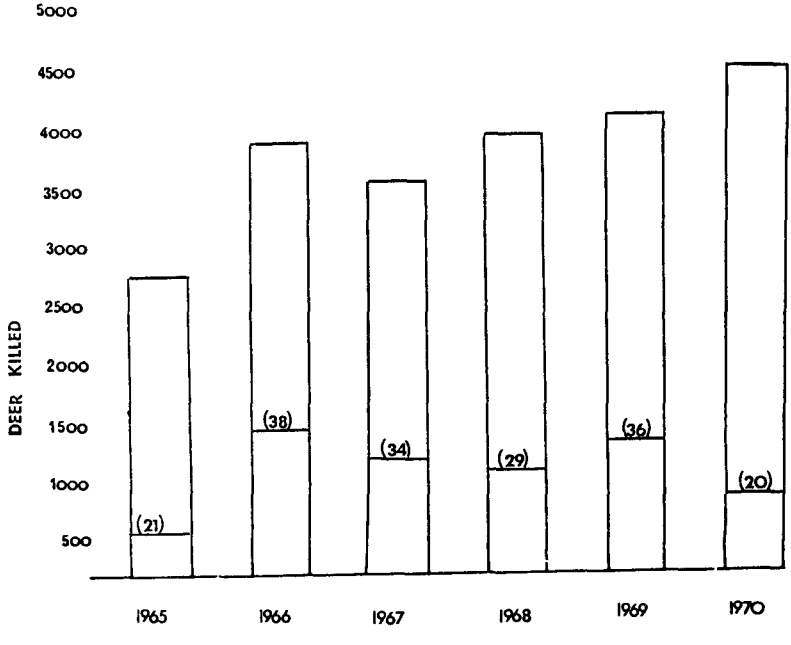

Figure 2. Number of deer killed with percent of kill in parentheisis White River Refuge 1965-1970.

Table 4. Average Dressed Weight of Deer in Pounds* for White River N.W.R. 1965-1970.

Year	B ½	D	B 1½	D	B 2½	D	B 3½	D	B 4½	D	B 5½+	D
1965	54.3	47.7	91.9	76.3	115.4	89.1	144.6	87.9	156.9	90.0	165.5	88.7
	(55)**	(71)	(54)	(50)	(25)	(66)	(5)	(42)	(2)	(9)	(2)	(20)
1966	55.1	49.5	101.9	77.9	107.4	96.3	148.8	90.1	178.3	90.3	189.5	87.5
	(73)	(64)	(53)	(44)	(21)	(43)	(10)	(33)	(3)	(18)	(2)	(26)
1967	51.4	46.4	91.1	74.8	117.0	84.4	141.2	86.3	154.0	89.9	144.0	86.6
	(120)	(96)	(173)	(104)	(53)	(93)	(36)	(83)	(14)	(39)	(6)	(58)
1968	52.2	47.4	93.7	75.0	121.6	87.6	148.7	88.8	143.3	88.4	159.0	87.3
	(105)	(115)	(122)	(83)	(57)	(134)	(36)	(69)	(3)	(41)	(6)	(55)
1969	57.6	47.6	81.9	77.5	115.5	88.2	139.5	86.5	151.8	91.5	173.4	90.0
	(135)	(157)	(148)	(129)	(54)	(114)	(62)	(87)	(8)	(74)	(7)	(64)
1970	53.3	47.4	97.7	78.0	131.3	86.6	148.7	89.8	173.4	85.0	169.2	90.6
	(106)	(80)	(146)	(83)	(39)	(63)	(24)	(49)	(12)	(26)	(4)	(26)

*Completely eviscerated

**Sample size in parenthesis

Table 5. Annual increment and total per-hunt population on White River N.W.R. 1965-70.

Year	Fawns Produced	Bucks ½	Bucks 1½	Bucks 2½+	Does ½	Does 1½	Does 2½+	Total
1965	1111	423	216	142	688	500	855	2824
1966	1567	702	344	237	865	589	1094	3831
1967	1163	486	432	251	677	627	1072	3545
1968	1606	683	324	299	923	546	1183	3958
1969	1437	650	516	268	787	741	1125	4087
1970	1799	765	462	399	1034	569	1217	4446

Table 6. Ratio of 2+ year old to 1½ year old bucks in population as reconstructed by the method described in Downing, *et al.* (unpublished).

Year	2+ per 100 yearlings
1965	66
1966	69
1967	58
1968	92
1969	52
1970	86

Reproduction

Calculations from Table 5 population reconstruction show the following reproductive rates for 1965-1971.

	Fawns per Adult female
1965	1.50
1966	1.60
1967	1.20
1968	1.34
1969	1.29
1970	1.55
1971	1.38
Overall	1.41

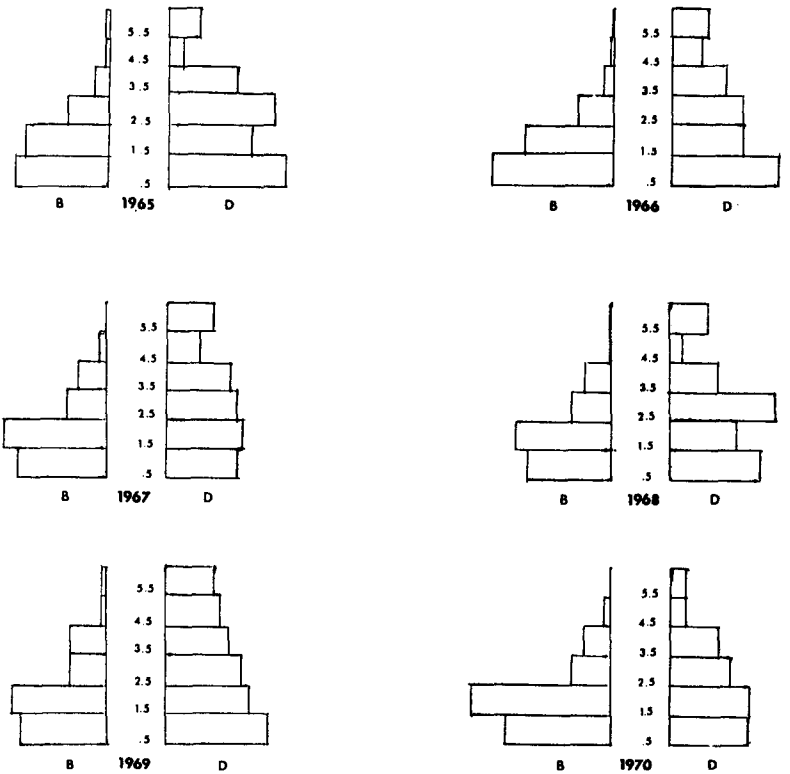

Figure 3. Age pyramids by sex of deer killed White River Refuge 1965-1970.

The overall recruitment rate of 1.41 is below the 1.76 fawn per doe average reproductive rate noted previously in this physiographic region of Arkansas (Wilson and Scalander, 1971). A reproductive rate of 1.65 was calculated for 2,250 white-tailed deer of all ages from 18 states (Noble, 1969).

Table 7. Fawn Sex ratio in population as reconstructed by the method described in Downing, *et al* (unpublished).

Year	Bucks/100 does
1965	61
1966	81
1967	72
1968	74
1969	83
1970	74

Because of the fact that annual flooding forces an unknown number of deer from the refuge and an equally unknown number return, it is illogical to assume that population figures and other parameters based on these numbers are precisely accurate. All we can assume is that the bias is farily constant so that year-to-year comparisons may be valid.

Economics

One aspect of this report seems readily applicable to deer management elsewhere and that is the economic impact of the hunt. It is estimated that deer hunting in Arkansas is directly a 26 million dollar a year business (Wilson, 1971). This business could become two to three times as large if hunters would agree to harvest deer elsewhere in the state and nation at the same rate that deer are harvested on the White River Refuge. We think the data from past hunts supports the contention that a larger percent kill, where feasible, can be accomplished with no adverse effect on the deer herd.

SUMMARY AND CONCLUSIONS

The White River National Wildlife Refuge was first opened to public gun hunting for deer in 1961. From 1961 through 1964, numbers of hunters were unlimited. From 1965 through 1970 the number of hunters was controlled to achieve deer herd management on a sustained yeild basis. All hunts have been either sex except during 1964 when bucks only were legal. Beginning with the 1965 hunt, sex, age, and weight data were collected.

From 1961 through 1970 hunters have removed a total of 16,491 deer. Hunting privileges have been granted to 69,770 individuals resulting in approximately 12,000 hunters use days. Hunter success for the nine either sex hunts varied from 43% in 1961 to a low of 15% in 1967. Hunter success based on the number of individuals participating averaged 22%.

The population was reduced from a high in 1961 of 9,500 deer to a low of 2,500 in 1964. Based on kill data collected, the 1970 population prior to hunting was 4,400. The population is slowly increasing, although annual harvest is between 30-40% of the deer herd.

One hunter per 15 acres appears to be the number of hunters needed to harvest one deer per 75 acres in a two day hunt. This concentration of hunters has produced an average annual harvest of 35% of the deer population. One hunter per 15 acres is adequate for hunter safety and if the deer population continues to increase the number of days will need to be increased rather than the concentration of hunters.

Results from annual either sex hunts indicate the herd is now near a 50-50 sex ratio. Deer weights have not changed significantly over the 10 year period. Browsing on forest reproduction indicates a balance between the herd and the habitat.

In areas of quality habitat with a stable deer herd at or near carrying capacity, it appears that harvesting between 30-40 percent of the herd annually on an either sex basis is biologically, socially and economically desirable.

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A SURVEY OF FURBEARER RESOURCES OF THE ATCHAFALAYA RIVER FLOOD PLAIN IN LOUISIANA

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ABSTRACT

Fur trappers in the area of the Atchafalaya River flood plain were interviewed following the 1971-72 season. Fur catch information from two portions of the flood plain, the swamp region and the marsh region, were compared; and the total fur catch was computed for the swamp region. Mean harvest values were computed and expressed as animals caught per trap-night per square mile per trapper. Differences between mean harvest values from the two regions were not significant for muskrat (*Ondatra zibethicus*), nutria (*Myocastor coypus*), and otter (*Lutra canadensis*). Mink (*Mustela vison*) and raccoon (*Procyon lotor*) harvest means were significantly higher in the swamp region than in the marsh region.

Harvest data were also obtained for different vegetative types within the swamp region. Three species (nutria, mink, and raccoon) each comprised an important portion of the total reported catch in this region and made up a large portion of the total reported income. In the marsh region, only the nutria comprised greater than ten percent of the total reported catch and income.

The mean net income of swamp region trappers was $1464.54, while the mean net income of marsh region trappers was $1198.77. During the 1971-1972 season, approximately 34 percent of all mink and 25 percent of all raccoons harvested in Louisiana were obtained in the swamp region of the Atchafalaya River flood plain, and the computed total value of the 1971-1972 fur harvest from this region was $172,000.