

## **Pre-sunrise Shooting at Nontarget Waterfowl during September Wood Duck Seasons**

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*Abstract:* Kentucky Department Fish and Wildlife Resources and Tennessee Wildlife Resource Agency evaluated the impact of pre-sunrise shooting on nontarget species during the 1991 September wood duck (*Aix sponsa*) season. Concealed observers in Kentucky and Tennessee recorded shooting activities of 88 hunting groups during the September wood duck season to determine if hunters discriminated between wood ducks and nontarget species during one-half hour before sunrise versus one-half hour after sunrise. A total of 424 single or flocks of waterfowl passed within shotgun range of observed hunters. Wood ducks comprised over 74% of the total shooting opportunities in both states. Shots at nontarget species were recorded on 4 and 10 occasions in Kentucky and Tennessee, respectively. Nontarget species represented <4% of the total harvest observed in our study. The number of times nontarget species were shot at varied by state ( $P \leq 0.05$ ) but not by time period. Hunters in Kentucky and Tennessee were able to discriminate between wood ducks and other protected waterfowl during the pre-sunrise period. Continuation of pre-sunrise shooting is recommended.

Proc. Annu. Conf. Southeast. Assoc. Fish and Wildl. Agencies 46:241-248

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Since the inception of the Migratory Bird Treaty Act of 1918, the U.S. Fish and Wildlife Service (USFWS) has frequently revised shooting hour regulations in response to harvest management strategies. The principal functions of regulating shooting hours are to facilitate the retrieval of downed game and reduce accidental harvest of non-target species (Reynolds 1990). Traditional shooting hours are from one-half hour before sunrise to sunset. More restrictive shooting hours have been imposed during years of poor waterfowl production and subsequent reduced fall flights, the latest in 1988 (U.S. Dep. Int. 1988a). In 1990, the USFWS evaluated data addressing the impact of shooting hours on the harvest of ducks taken during regular duck seasons. They concluded that pre-sunrise shooting did not significantly increase the harvest of waterfowl or nontarget species and, therefore, proposed to

permit shooting to start one-half hour before sunrise during the regular duck season. However, the USFWS elected to restrict special seasons to sunrise openings because data were lacking assessing the impact of pre-sunrise shooting on nontarget species (Reynolds 1990).

Kentucky Department of Fish and Wildlife Resources (KDFWR) and Tennessee Wildlife Resource Agency (TWRA) began experimental September duck seasons in 1981. Initially, the September season was open to the taking of all waterfowl species with daily bag limits designed to focus harvest on wood ducks and blue-winged teal (*Anas discors*). In 1986, the wood duck daily bag limit was reduced from 4 to 2 because of USFWS concern about possible overharvest (U.S. Dep. Int. 1986). The September season became a wood duck only season in 1988 when prairie nesting duck populations, including blue-winged teal, drastically declined and September seasons for prairie nesting species were suspended (U.S. Dep. Int. 1988b).

September season shooting hours in Kentucky and Tennessee seasons have varied since initiation in 1981. Since 1985, shooting hours have been one-half hour before sunrise to sunset in an effort to provide better hunting opportunity (V. R. Anderson, unpubl. rep., KDFWR, Frankfort, 1984). The objective of KDFWR and TWRA was to examine pre-sunrise shooting during the 1991 September wood duck season to evaluate the potential impact on nontarget species.

We would like to thank the staff of KDFWR and TWRA for their assistance in this study. J. D. Sole, V. R. Anderson, R. M. Morton, and D. A. Graber provided helpful reviews of previous drafts of this manuscript.

## Methods

Habitats within Kentucky and Tennessee vary from west to east. Low gradient rivers, wide floodplains, sloughs, oxbow lakes, semi-permanent inundated swamps, extensive seasonally flooded bottomland hardwoods, and agricultural lands are common in the west (Braun 1967, Christensen 1991). Eastern habitats are characterized by rivers and streams with moderate gradients, riparian forests, moderately wide floodplains, sloughs, and small oxbow wetlands (Greller 1991). Most major rivers and many of the secondary tributaries are impounded in a series of reservoirs.

### Kentucky Study Area

USFWS county harvest estimates for Kentucky indicate 71% of the total duck harvest and 77% of the September season harvest occurs in the western one-third of the state (USFWS, unpubl. data; V. R. Anderson, unpubl. rep., DPFWR, Frankfort, 1984). Most of Kentucky's important waterfowl habitat and all but 1 of the state's waterfowl management areas are within that region. Therefore, data collection was limited to that region of the state. Study sites included KDFWR Wildlife Management Areas and private properties in 9 counties: Ballard, Calloway, Henderson, Hopkins, Livingston, Muhlenberg, Ohio, Trigg, and Union.

## Tennessee Study Area

Estimated distribution of the average annual harvest of wood ducks in Tennessee indicates approximately 66% are taken in the western one-third of the state, but wood duck hunting is also popular on state and federal lands in central and eastern regions (TWRA 1985). Observations focused on wildlife management areas and private lands in the western Tennessee. Additional data was also collected on state and federal areas in central and eastern Tennessee to insure an adequate sample size.

## Data Collection

Data were collected using spy blind procedures (Mikula et al. 1972). When possible observers were in position before hunting groups arrived. However, if no hunting groups arrived in assigned areas, observers would change position in an effort to locate other hunters before the beginning of shooting time. All hunting groups within the field of vision were observed from concealed positions at each site. Data were collected for the entire 5-day season. Observers were grouped together in teams of 2 with at least 1 observer competent in waterfowl identification present at each position. Binoculars and/or spotting scopes were used to aid in species identification.

Observations began 30 minutes before sunrise or when the first shots were fired, whichever occurred first, and continued until 30 minutes after sunrise. Data for each study site included: location, date, beginning of legal shooting hours, number of blinds observed (or hunters), and number of hunters in each blind. The following information was collected for each blind or hunter: number of flocks or individual ducks (identified to species when possible) passing within range ( $\leq 35\text{m}$ ), time shots fired, number ducks downed, and number ducks retrieved. Hunter bag checks were conducted in the field when possible, either at the end of the observation period or when a group prepared to leave the area.

Data were summarized by state and time period of encounter. Each opportunity (flock or individual waterfowl within shotgun range) was categorized as target or nontarget for the purpose of these analyses. A 2-way analysis of variance was used to examine for differences in the number of opportunities between states and time periods (Sokal and Rohlf 1969). Differences in the proportion of target and nontarget species by state and period were tested using Chi-square analysis. The number of nontarget species encountered were then summarized by state, time period, and instances of shots fired. To better examine differences between time periods, we examined the number of times at which protected waterfowl were shot, weighted by the total opportunities for each state and time period. A linear response analyses using Proc CATMOD (SAS Inst. Inc. 1987) with instances of shots fired as the dependent variable was used to examine the relationship between the independent variables state and time period. We tested the null hypothesis; the number of incidents of shots taken at nontarget species during September wood duck seasons did not differ between the time periods one-half before sunrise (pre-sunrise) and one-half hour after sunrise (post-sunrise).

## Results

Observers in the 2 states recorded 480 individuals or flocks (opportunities) of waterfowl that passed within shotgun range of 88 hunting parties during September 1991 wood duck season. Although extensive efforts were made to obtain data from private lands, only 6 parties provided usable data. Therefore, public and private lands were combined for the analyses. Nine observations in Kentucky and 47 in Tennessee were subsequently excluded because observers were spotted or critical data (i.e., species, time shots fired, etc.) were not recorded. This reduced the number of usable hunter groups to 81 with 424 potential shooting opportunities (Table 1).

Wood ducks comprised >74% of all shooting opportunities for each state (Table 1). When shots were fired, wood ducks were the target species in 293 of the 307 opportunities. The number of opportunities hunters had to shoot at wood ducks and nontarget species differed between states ( $F = 6.70, P < 0.01$ ) and time period ( $F = 8.57, P = 0.004$ ). Kentucky hunters had almost twice as many shooting opportunities as hunters in Tennessee. Mean number of opportunities per hunter/group were 6.4 and 3.9 for Kentucky and Tennessee, respectively. Hunters had 321 opportunities to shoot at waterfowl during the pre-sunrise period versus 103 during the post-sunrise period. The proportion of opportunities recorded for each time period were similar for both states ( $X^2 = 0.676, P = 0.411$ ). However, the total number of opportunities hunters had to shoot at wood ducks was substantially greater during pre-sunrise versus post-sunrise periods (Table 1). About 76% and 74% of all opportunities to shoot at wood ducks and nontarget waterfowl occurred during the pre-sunrise period in Kentucky and Tennessee, respectively.

Nontarget waterfowl encountered by hunters during the September wood duck season included blue-winged teal, green-winged teal (*Anas crecca*), mallard (*A. platyrhynchos*), gadwall (*A. strepera*), American wigeon (*A. americana*), and Canada geese (*Branta canadensis*). Hunters in Kentucky and Tennessee had 72 and 21 opportunities, respectively, to shoot at nontarget waterfowl during this study. Blue-winged teal comprised almost 74% of all nontarget shooting opportunities in both states. Mallards were second at about 13%. All other species combined totaled the remaining 13%.

**Table 1.** Number of blinds and waterfowl shooting opportunities during the 1991 September wood duck season in Kentucky and Tennessee.

State	Blinds observed	Number of opportunities	Time Period					
			Presunrise (%)			Postsunrise (%)		
			Wood Duck	Blue-winged teal	Other <sup>a</sup>	Wood duck	Blue-winged teal	Other <sup>a</sup>
Kentucky	44	281	157(56)	45(16)	13(5)	52(18)	9(3)	5(2)
Tennessee	37	143	90(63)	10(7)	6(4)	32(22)	0	5(4)
Total	81	424	247(58)	55(13)	19(4)	84(20)	9(2)	10(2)

<sup>a</sup>Others include mallard, gadwall, green-winged teal, American wigeon and Canada geese.

Hunters shot at nontarget species in 14 of the 93 opportunities in which they were encountered (Table 2). The number of protected species shot at varied by state ( $G^2 = 7.11$ , 1 df,  $P = 0.008$ ) but not by time period ( $G^2 = 1.81$ , 1 df,  $P = 0.179$ ) or state by time period interaction ( $G^2 = 2.37$ , 1 df,  $P = 0.124$ ). Observers reported nontarget species were shot at 2.5 times more often in Tennessee than Kentucky (Table 2). However, 7 of the 10 incidents recorded for Tennessee were attributed to 1 group of hunters. When this group was removed from the sample and the data reanalyzed, we found no difference between states ( $G^2 = 1.43$ , 1 df,  $P = 0.2319$ ) or time periods ( $G^2 = 0.13$ , 1 df,  $P = 0.7171$ ).

All but 3 of the nontarget species shot at were blue-winged teal. One mallard and 1 killdeer (*Charadrius vociferus*) were shot at in Tennessee and 1 American wigeon was shot at in Kentucky. Two and 5 nontarget species in Kentucky and Tennessee, respectively, were shot and harvested during this study.

## Discussion

Species composition of harvest may be influenced by the time shooting begins each day. Many species of waterfowl may be more available to hunters during crepuscular periods as they travel between foraging and resting areas (Bellrose 1944, Jorde and Owen 1988, Paulus 1988). Examination of federal harvest estimates for 1988 and 1989 waterfowl seasons indicated the harvest of wood ducks (bag limits constant between years) increased in 1989 when pre-sunrise shooting period was offered. In a recent Indiana study, hunters shot more wood ducks during the pre-sunrise period on 3 of 4 wildlife management areas sampled (D. F. Caithamer, pers. commun.). Reynolds (1990) examined harvest data from Carney (1975) and concluded pre-sunrise shooting may account for up to 21% of the total wood duck harvest during the regular duck season.

In our study wood ducks comprised >72% of the total shooting opportunities during the pre-sunrise and post-sunrise periods. While the percent of wood ducks and nontarget species encountered did not change between the 2 time periods, the total number of wood duck shooting opportunities did differ. There were 3 times as many opportunities to shoot at legal ducks during the pre-sunrise period than the post-sunrise. Our data suggest pre-sunrise shooting would provide hunters more opportunities to harvest wood ducks during that period when they are most available.

**Table 2.** The number of hunter opportunities and instances of shots fired at nontarget waterfowl observed during the 1991 wood duck season in Kentucky and Tennessee.

State	Time period				Total	
	Pre-sunrise		Post-sunrise		# Opportunities	# Shot at
	# Opportunities	# Shot at	# Opportunities	# Shot at		
Kentucky	58	3	14	1	72	4
Tennessee	16	9	5	1	21	10
Total	74	12	19	1	93	14

The number of instances in which nontarget species were fired upon in our study were substantially less than observed for other special seasons. During our study protected waterfowl comprised <5.0% of the total instances in which shots were taken in both time periods. This compares to 11.5% and 9.0% reported by Blandin (1981) for September teal and scaup seasons, respectively. In addition, we found the proportion of shots taken at protected species during the pre-sunrise period was about 53% less than recorded for September teal seasons from 1965–76 when shooting hours were from sunrise to sunset (Blandin 1981). Observers in our study reported 5.0% of the waterfowl downed by hunters were illegal species compared to 6.4% reported for the September teal season (Martinson et al. 1966) and 6.6% for special scaup seasons (Blandin 1981).

The proportion of protected species fired at in Kentucky during the pre-sunrise period was actually less than during the post-sunrise period, though not significantly. In Tennessee, the difference observed between time periods were almost exclusively attributed to 1 group of hunters which shot indiscriminately throughout the observation period. When this group was removed and the data re-examined little difference between states or shooting periods was observed. It is possible this group of hunters in Tennessee were not able to identify legal waterfowl species. However, this group also shot at species other than waterfowl (killdeer). Therefore, based upon the observed activities of this group it is likely they may have shot indiscriminately at other wildlife during the regular duck season too.

Our data indicated pre-sunrise shooting during the September wood duck season had little impact on protected species and may help to focus harvest on the target species by allowing hunters to take wood ducks during the pre-sunrise period when more opportunities exist. The indiscriminate shooting by the 1 group of hunters in Tennessee does not reflect the selectivity exhibited by other groups observed during this study. Four of the 7 groups that attempted to take illegal birds shot at only 1 flock even though others passed within range. This appears to indicate those hunters also tried to identify species before shooting.

Violations of migratory bird regulations are a major concern to federal and state wildlife agencies. Data obtained from spy-blinds revealed about 20% of observed hunting parties violated regulations (Mikula et al. 1972, Hopper et al. 1975). Shooting hour violations were the most common infraction (Mikula et al. 1972, Hopper et al. 1975, Reynolds 1990). Hopper et al. (1975) reported that most violations occurred within 5 minutes of the legal shooting hour and may not constitute intentional violations.

Shooting hour violations may be a function of opportunity. Prior to the 1988–89 change to a sunrise opening, only about 2% of the total shots taken for Maryland hunters were before the legal shooting time of one-half hour before sunrise (Reynolds 1984). However, this figure more than doubled during the 1988–89 hunting season when legal shooting time started at sunrise (Reynolds 1990). Prudent waterfowl management balances harvest opportunity with species protection. When possible, regulations should be structured to reduce the potential for violation while achieving management objectives.

## Conclusions

Results of this study indicate hunters are at least able to discriminate between wood ducks and other species during the pre-sunrise period of the September wood duck season in Kentucky and Tennessee. Shooting violations appeared to be the act of indiscriminate shooting and probably would have occurred during either time period provided the opportunity was available. Limiting shooting hours to sunrise would be an unnecessary regulation that may encourage violations because of ample opportunities to take legal waterfowl and the hunters' recognition that these opportunities will diminish rapidly after sunrise. We recommend continuation of pre-sunrise shooting the current experimental September wood duck seasons.

A hunter's ability to identify legal waterfowl is a critical component in any special season. Although hunters in Kentucky and Tennessee were able to identify wood ducks during the pre-sunrise period, we did not examine if they could identify other species. Wood ducks are the most recognized and abundant waterfowl in the region during September (Bellrose 1980). Thus, the ability of hunters in Kentucky and Tennessee to identify legal ducks may be a function of familiarity. It is not known whether our hunters would be able to identify a less common duck during the pre-sunrise period if that duck was the only legal species. Therefore, the impact of pre-sunrise shooting hours on nontarget species should also be examined for other species specific seasons.

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