Eastern Wild Turkey Gobbler Harvest and Physical Characteristics in Southeastern Louisiana

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Abstract: To gain a better understanding of the roles of public and private hunting areas in the harvest dynamics of an eastern wild turkey (*Meleagris gallopava var. sylvestris*) population, we conducted a banding study in southeastern Louisiana from 1989–1997. Physical measurements were collected on birds at capture and harvest. During spring gobbler seasons, 137 of 199 banded gobblers were recovered through hunting. For the 1991–1994 seasons, we observed higher hunting pressure and more effort to bag a gobbler on public (0.22 hunter-days/ha and 40.7 hunter-days/bird) than on private land (0.13 hunter-days/ha and 15.6 hunter-days/bird). We captured a higher proportion of juvenile gobblers on a public area than on surrounding private land ($P = 0.024$), but found only weak evidence ($P = 0.073$) that hunters on the public land harvested a greater proportion of juveniles. The direct recovery rate for juveniles was 23% (SE = 3.7) and for adults was 70% (SE = 5.5). We estimated annual survival to be 0.16 (SE = 0.05) for gobblers banded as adults and 0.46 (SE = 0.47) for gobblers banded as juveniles. Body mass and spur length of 2-year-old gobblers were less ($P \leq 0.006$) than ≥3-year-old birds. However, beard length was not. We produced a logistic regression model that classified 2-year-old gobblers and ≥3-year-old gobblers with 80%–86% apparent accuracy. We concluded that this model was insufficient for improving harvest models because few older gobblers remain in hunted populations.

Proc. Southeast. Assoc. Fish and Wildl. Agencies 51:381–388

Wild turkeys were extirpated from much of Louisiana between 1880 and 1900 (St.Amant 1959:144), but flocks persisted in portions of Washington Parish in southeastern Louisiana (Hollis 1950). Turkey abundance in Washington Parish increased dramatically after 1987 with the incorporation of 5,600 ha into the wildlife management area system of the Louisiana Department of Wildlife and Fisheries (LDWF) as

Ben's Creek Wildlife Management Area (BCWMA). Because of the proximity of this area to Baton Rouge and New Orleans, heavy turkey hunting pressure was anticipated.

In a recent review of harvest mortality, Vangilder (1992) provided evidence that gobbler harvest can be highly variable among locales and among years, but he does not mention effects of access on harvest rates or structure. The initial goal of this study was to develop baseline data on the turkey population and harvest trends on BCWMA. After the second year, the scope was broadened to include adjacent private hunting clubs and investigate the roles of public and private hunting areas in harvest dynamics. We also were interested in developing a method to classify adult gobblers into >1 age class to allow more refined assessments of age-specific mortality. Specifically, our objectives were to estimate survival and recovery rates of gobblers, compare hunt and harvest characteristics of public vs. private turkey hunting, determine the influence of age on harvest susceptibility, and examine physical characteristics of gobblers by age class.

Many people contributed to make this study possible. We thank T. A. Bruhl, F. G. Kimmel, J. C. Davis, D. W. Moreland, R. J. Love, J. R. Mullins, D. Timmer, Jr. (LDWF personnel), J. A. Wagnon, J. R. Magee, R. S. Durham, and members of the Mosher Hill, Ten Point Buck, and Adam's Creek hunting clubs. We also thank Cavenham Forest Industries (the major property owner at the initiation of the study) and Weyerhaeuser Company (current owners) for access to their lands. Without these individual and corporate assistances, the project would not have been possible.

Methods

Study Area

The study area, located in Washington Parish in southeast Louisiana, included the 5,600-ha BCWMA and approximately 9,100 ha (5,100 ha of core club lands) of surrounding private lands. The BCWMA was established on corporate lands leased by LDWF to increase public hunting opportunities. Nearly all of the study area was under 1 ownership and forest management scheme. It was predominantly forested with loblolly pine (*Pinus taeda*) plantations managed for pulpwood production. Plantations are generally prescribed-burned at 8–12 years of age and thereafter as warranted. One thinning occurs about mid-rotation with final harvest between ages 25 and 30 years. Red maple (*Acer rubrum*), black cherry (*Prunus serotina*), persimmon (*Diospyros virginiana*), and red oak (*Quercus falcata*) also were found in the overstory. Yaupon (*Ilex vomitoria*), flowering dogwood (*Cornus florida*), waxmyrtle (*Myrica cerifera*), broomsedge (*Andropogon* spp.), American beautyberry (*Callicarpa americana*), and blackberry (*Rubus* spp.) were found in the mid- and understory. An extensive system of wildlife food plots (spring and fall plantings) was established to enhance the quality of the pine plantation habitat on BCMWA and the private lands. The topography of the area is gently rolling.

Several small creeks also were found in the area. Streamside zones were dominated by blackgum (*Nyssa sylvatica*), yellow poplar (*Liriodendron tulipifera*), and sweetbay magnolia (*Magnolia virginiana*). Water oak (*Quercus nigra*) was a minor

component of the overstory. Waxmyrtle, titi (*Cyrilla racemiflora*), inkberry (*Ilex glabra*), giant cane (*Arundinaria gigantea*), and greenbriar (*Smilax* spp.) commonly were found in the understory of this habitat type.

Trapping, Banding, and Hunting and Physical Characteristics

We live-trapped turkeys during late December–early March, 1989–1994 using rocket nets (Austin 1965). Each captured turkey was banded with a numbered aluminum band that had the address and telephone number of the LDWF and an identification number. In addition, we weighed each bird to the nearest 0.1 kg, classified it as juvenile or adult (Pelham and Dickson 1992:40), and measured beard(s) and spurs (±0.6 cm and 0.3 cm, respectively). Trapping occurred only on BCWMA during the first 2 years of the project but was conducted on lands of 3–5 nearby hunting clubs in subsequent years.

Verification of band recovery and physical data was made as soon as possible, usually within 24 hours of the kill. Physical characteristics of harvested birds were determined by either LDWF personnel or hunters. A mandatory self-clearing check station was operated on BCWMA during the project, but most turkeys bagged on BCWMA were checked by LDWF personnel. Hunter efforts on BCWMA were determined from the self-clearing station data. Hunting clubs maintained their own records on data sheets furnished by LDWF. We furnished identical spring scales and rulers to participating clubs. No estimated weight was accepted, but a few turkeys harvested off BCWMA and participating clubs were weighed on other scales (e.g. local stores). Hunting seasons began the third Saturday in March and extended 37 days in BCWMA (1989–1994), 23 days in BCWMA (1995–1997), and 37 days on surrounding lands (1989–1997).

Analyses

Physical Characteristics.—We used analysis of variance to test for differences in physical characteristics measured at initial capture by age class (juveniles and adults) and year. Based on physical characteristics measured at harvest, we used multivariate analysis of variance to test the hypothesis that known 2-year-old birds had different physical characteristics than known ≥3-year-old birds. The ≥3-year-old birds included those banded as adults and harvested ≥1 year after banding and those banded as juveniles and harvested ≥2 years later. This test used physical characteristics measured at harvest. If the MANOVA provided evidence to reject, we used analysis of variance to determine which individual measurement led to this difference. We used logistic regression analysis to determine whether these physical characteristics were adequate to predict 2 adult age classes. All analyses were conducted using SAS procedures (SAS Inst. 1985).

Access (Public vs. Private).—Similarly aged birds appeared to be clustered within capture events. Consequently, we averaged the proportion of juveniles caught during each capture event as an estimate of age structure. We used a *t*-test to test for differences in this statistic between BCWMA (public) and hunting clubs (private). A

Chi-square analysis was used to determine whether age classes were harvested at different proportions on BCWMA and the hunting clubs.

Survival and Recovery.—We used standard band recovery methodology to estimate survival and recovery rates among banded gobblers (Lebreton et al. 1992). We used program MARK (G. C. White, Colo. State Univ., Fort Collins, Colo.) to calculate model estimates and perform tests among competing models. We examined the fit of 16 models evaluating recovery and survival parameters as either constant (.), dependent on age (g), dependent on year (t) or dependent on both (g*t). For example, S(g*t) r(g*t) was the most complex model (i.e., having the most parameters to estimate) and assumed survival and recovery rates to vary both by age and year, whereas S(.) r(.) was the simplest model and assumed survival and recovery rates to be constant across age and years.

Results and Discussion

Forty-eight capture events from 1989 to 1994 resulted in the handling of 204 gobblers. A total of 199 were banded and released on site (28 adults and 96 juveniles on BCWMA and 38 adults and 37 juveniles on club lands). The number of birds captured in a year ranged from 8 to 62. Three birds died during capture and handling, and 2 birds were relocated for restoration purposes. The juvenile ratio adjusted for capture event on all lands was 60% (SE = 6.6). However, juveniles ($\bar{x}$ = 72%, SE = 7.5) comprised a greater (t = -2.33, 46 df, P = 0.024) proportion of the gobblers captured on BCWMA than club lands ($\bar{x}$ = 42%, SE = 11.2).

Physical Characteristics

All physical attributes measured on adults were greater than juveniles (Table 1). Masses varied among years (F = 3.45; 5, 197 df, P = 0.0052) but there was no age by year interaction ($P < 0.05$). The difference between the highest and lowest yearly mean mass was 0.63 kg. Physical attributes of turkeys in our study were generally consistent with Pelham and Dickson (1992) and Lewis (1967). However, it appeared that the adults in our study were slightly smaller in mass than reported

Table 1. Physical characteristics measured on wild turkey gobblers banded in southeastern Louisiana, 1989–1994.

	Adult			Juvenile			
Characteristic	N	$\bar{x}$	SE	N	$\bar{x}$	SE	Year
Beard length (cm)	68	21.00	0.40	136	5.74	0.28	All
Spur length (cm)	68	2.12	0.04	136	0.49	0.03	All
Mass (kg)	0			8	5.70	0.19	1989
	9	7.66	0.13	12	5.35	0.12	1990
	28	7.37	0.08	34	5.06	0.08	1991
	8	7.50	0.12	21	5.19	0.10	1992
	11	7.64	0.10	34	5.33	0.08	1993
	12	7.38	0.10	27	5.08	0.09	1994

adult averages. A high proportion of young adults or 2-year-olds in our sample may have contributed to this difference.

Physical characteristics of known 2-year-olds and ≥3-year-olds were examined at harvest to determine whether adult gobblers could be classified into >1 adult age class. Kelly (1975) evaluated spur length, beard length, and weight for age estimation in Missouri and effectively classed 1-, 2-, and 3-year-old gobblers using spur length. We detected significant differences for spur length and weight, but not beard length. Spurs of older adults ($\bar{x}$ = 2.68 cm, SE = 0.12) were longer (F = 14; 1, 55 df, P = 0.0005) than spurs of 2-year-olds ($\bar{x}$ = 2.19 cm, SE = 0.06) and mass of older adults ($\bar{x}$ = 7.80 kg, SE = 0.19) was greater (F = 8; 1, 55 df; P = 0.0059) than mass of young adults ($\bar{x}$ = 7.18 kg, SE = 0.09). Logistic regression modeling predicted age classes with an 80%–86% apparent accuracy for our sample. Although it might be helpful to consider 3 age classes (juvenile, 2-year-olds and ≥3-year-olds) in population assessments, we need low misclassification rates to refine management. Because of the small number of ≥3-year-olds, this accuracy was not considered satisfactory. Nevertheless, a measurement modeling approach has promise if more precise measurements or additional characteristics, such as spur shape (rounded vs. pointed), are collected.

Influence of Access

During the 1991–1994 hunting seasons, hunter effort on the core hunting clubs (2,570) was about 50% of that of BCWMA (5,007), but harvest on clubs (164) was 33% greater than on BCWMA (123). It took about 2.5 times more effort (40.7 hunter-days vs. 15.6 hunter-days) to harvest a gobbler on BCWMA than on club lands. Several factors influence these results; however, unrestricted numbers of hunters on BCWMA and emigration of turkeys off BCWMA may have accounted for much of the difference. On an area basis, BCWMA received 69% more effort than core club lands (0.22 efforts/ha vs. 0.13 efforts/ha). The emigration of gobblers from BCWMA is suggested by 10 birds banded on BCWMA being harvested on club lands, but no birds banded on club lands were harvested on BCWMA. This represents 13% of the harvested birds (N = 77) that were banded on BCWMA. Although effort suggests that BCWMA was more heavily hunted, harvest of banded birds was high on both public and private lands. Mean turkey bag was 0.006/ha and 0.008/ha on BCWMA and core clubs, respectively.

Godwin et al. (1990) reported that an average of 34% of gobblers radio-tagged on a public area in Mississippi moved to private lands for the spring hunting season. They suggested that this movement was not a result of hunting pressure because movements frequently occurred before the hunting season, but seemed to be associated with flock break-up. Everett et al. (1978) reported a similar finding but their sample size was very small. Williams et al. (1978) reported that high hunting pressure during fall seasons on a south Florida public area did not result in the movement of birds off the area, but suggested that surrounding habitat (or lack of) may have played a role in the lack of dispersal. We cannot identify whether the movement of gobblers from BCWMA was attributable to hunting pressure. However, it should be noted that mean hunting pressure (efforts/ha) on BCWMA and core hunting club lands was

633% and 333%, respectively, greater than for the Mississippi site (0.03 efforts/ha). Harvest rates (turkeys/ha) on BCWMA and core club lands were 200% and 300%, respectively, greater than the Mississippi site (0.002 turkeys/ha; Lint et al. 1993).

There was only weak evidence (χ^2 = 3.2, 1 df, P = 0.073) that hunters on BCWMA harvested a greater proportion of banded juveniles compared to hunters on club lands (29% vs 16%). If the proportion of juveniles to adults at capture was indicative of the relative availability of juveniles available, then our data suggest that hunters on BCWMA were not different in terms of selectivity because of the predominance of juveniles on BCWMA. This is contrary to the belief that hunters on public lands are less likely to be selective than their counterparts on private lands.

Recovery and Survival

During the 1989–1997 hunting seasons, 137 of the 199 banded turkeys were recovered. Direct recovery rates for adults was 70% and for juveniles was 23%. For combined age classes, the direct recovery rate was 38%. The season immediately after banding accounted for 88% of the returns for adults (Table 2). Juvenile recoveries were predominantly distributed over the first 2 seasons (36% and 55%, respectively). The direct recovery rate was higher than those reviewed by Vangilder and Kurzejeski (1995:33) for adult, juvenile, and combined age classes for Missouri, Kentucky, and Mississippi. However, with the exception of Mississippi, season length in Louisiana, when direct recoveries were possible, was about twice as long as in other states.

The banding model with the lowest Quasi Akaike Information Criterion (QAICc) was S(g) r(g), which implied that the inclusions of age-specific mortality and age-specific recovery rates were sufficient to model these data. This model contained only 4 parameters, but fit the data as well as S(g*t) r(g*t) (χ^2 = 23.39, 21 df, P = 0.32). A 3-parameter model that included age-specific mortality and constant recovery, S(g) r(.), had the next lowest QAICc, but was significantly different in fit from S(g) r(g) (χ^2 = 3.89, 1 df, P = 0.050). Thus, we chose S(g) r(g) and estimated adult and juvenile survival rates as 0.16 (SE = 0.05) and 0.46 (SE = 0.04), respectively. Estimated adult and juvenile recovery rates were 0.79 (SE = 0.05) and 0.65 (SE = 0.04), respectively. In his review, Vangilder (1992) noted that reports of gobbler survival rates were very limited. Several authors have reported a single survival rate for juvenile and adult gobblers estimated by combining age classes (Vangilder

Table 2. Harvested banded gobbler recoveries on the Ben's Creek Wildlife Management Area and nearby hunting clubs in southeastern Louisiana, 1989–1997.

	Season after banding					
Age class	1	2	3	4	5	Total
Adult (N = 66)	46	3	2	1	0	52
Juvenile (N = 133)	31	47	4	2	1	85

1992). Vangilder (1992:154) reported similar annual survival rates for adult (S = 0.382, SE = 0.065) and juvenile (S = 0.333, SE = 0.056) gobblers in Iowa. Combining birds to produce a single estimate in this case would not appear to be too great an error. However, our results suggested that a single estimate of survival can be a misrepresentation.

Management Implications

Wild turkey hunting has grown in popularity during the past 2 decades and public and private lands often receive high hunting pressure. The demonstrated high gobbler harvest on our study area further highlights the importance of annual production to the success of turkey hunting. Fixed, traditional long seasons for high use areas may not be appropriate. Rather, seasons should be thoroughly evaluated annually and adjusted relative to production. Williams et al. (1978) concluded that effective hunting regulations can have more effect on turkey populations than food plots, restocking, and many other management techniques. We believe that regulatory changes to consider in 2 successive years of poor production include timing of the season relative to breeding, length of the season, and bag limits. Regulatory measures also must consider potential harvest on adjoining lands due to normal movements as suggested by Godwin et al. (1994). This approach may be more warranted in small or insular populations in fragmented habitat.

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