



ESTABLISHING OPENING DATES FOR SPRING WILD TURKEY HUNTING SEASONS

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Wild Turkey Working Group
of the
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This white paper was prepared by the Wild Turkey Working Group of the Wildlife Resources Committee for the Southeastern Association of Fish & Wildlife Agencies. This document is not intended to be a binding document, but provides technical information and recommendations for consideration in establishing opening dates for spring turkey seasons. This document was adopted by the Wildlife Resources Committee on October 16, 2016 and was subsequently adopted by the SEAFWA Board of Directors on October 18, 2016 in Baton Rouge, Louisiana

Executive Summary

Wild turkeys (*Meleagris gallopavo*; hereafter, turkeys) are widely recognized throughout the southeastern United States as a species of ecological, recreational, aesthetic, and economic importance. As a game species, turkeys are most popularly pursued during the spring, a timeframe coinciding with the bird's breeding and nesting activities. Given this period's biological importance, managers are challenged to avoid negative population impacts while simultaneously providing quality hunting opportunities. Biological considerations associated with timing spring turkey season frameworks include the potential effects of early and excessive male harvest on productivity and the tendency for intentional or inadvertent illegal female kill to occur earlier in the reproductive season. Turkey hunters often request frameworks to maximize exposure to gobbling activity, but these sociological considerations may conflict with biological concerns. Recent declining trends in turkey reproductive indices, abundance, and harvest in several southeastern states have heightened the need to evaluate potential consequences of spring hunting season timing on turkey population demographics. In this report, the Southeast Association of Fish and Wildlife Agencies Wild Turkey Working Group (SEAFWA-WTWG) summarizes factors state wildlife agencies should consider when setting the timing of spring turkey seasons. Based on this literature review, the SEAFWA-WTWG suggests spring turkey season opening dates that coincide with peak egg-laying (i.e., the mean date of initial nest initiation) are biologically sound and may reduce illegal female kill. This season timing also addresses concerns surrounding potential effects of male harvest on productivity, while acknowledging hunter expectations of hearing vocal male turkeys when hunting. Furthermore,

the SEAFWA-WTWG suggests state wildlife agencies should place emphasis on research to reduce uncertainty surrounding this important topic.

Introduction

Although historically abundant, turkey numbers in the southeastern United States declined precipitously during the late 1800s and early 1900s because of unregulated harvest and habitat loss (Kennamer et al. 1992). Due largely to restoration efforts by SEAFWA member states and their partners, turkeys now exist throughout the region. With an estimated population of about 2.6 million turkeys in the SEAFWA geography (Eriksen et al. 2015) and established spring turkey hunting seasons in all member states, turkeys are widely recognized as an important species from an ecological, recreational, aesthetic, and economic standpoint.

Unlike hunting seasons for other North American gallinaceous birds, spring turkey seasons coincide with breeding and nesting, challenging managers to provide hunter opportunity without negatively affecting turkey populations during a sensitive biological period (Kurzejeski and Vangilder 1992). The timing of spring turkey season is therefore a significant management consideration which must take into account turkey reproductive chronology and harvest susceptibility (Kurzejeski and Vangilder 1992). Concurrently, managers must also acknowledge the relationship between season timing and hunter satisfaction (Taylor et al. 1996). Seeing (Little et al. 2001, Nicholson et al. 2001, Dingman et al. 2005), hearing (Vangilder et al. 1990, Thackston and Holbrook 1996, Isabelle and Reitz 2015), and harvesting turkeys (Swanson et al. 2005) are often cited as factors most positively effecting the spring hunting experience, and the behavioral tendencies of male turkeys that dictate these interactions with hunters (e.g., gobbling propensity) can vary considerably throughout the breeding season's progression (Bevill 1973, Miller et al. 1997*b*, Palumbo 2010).

Unsurprisingly, the philosophical balance between the biological and sociological considerations of spring season timing is weighed differently among states (Kurzejeski and Vangilder 1992). In some states, spring turkey seasons are timed to occur after the first peak in gobbling activity so that the second gobbling peak (Bevill 1975) will fall midway through the hunting season (Kurzejeski and Vangilder 1992). This approach aims to lessen disruption to turkey breeding activities, diminish potential for illegal female kill, and an increase responsiveness of turkeys to hunters' calls. Conversely, this framework yields relatively short seasons, which limits hunting opportunity in comparison with other approaches. This shorter approach may also increase chances for periods of extended inclement weather to reduce gobbling activity and hunter success during the season (Norman et al. 2001*a*). Furthermore, in hunted populations, two peaks in gobbling may not always be present (Kienzler et al. 1996, Miller et al. 1997*b*, Norman et al. 2001*a*, Palumbo 2010, Colbert 2013), challenging the idea spring seasons should be structured in such a manner. In other states, spring turkey seasons begin early in the reproductive season and can nearly span the entire breadth of gobbling activity. This framework increases hunting opportunities, lessens the impact of inclement spring weather on hunting success by offering more potential days afield (Norman et al. 2001*a*), but ignores critical biological considerations which may dictate long-term turkey population health. Given these differing perspectives, spring turkey seasons vary greatly throughout the Southeast as strategies have evolved to fit state-specific turkey management goals and hunter preferences.

Recently, many SEAFWA states have documented declining trends in turkey reproductive indices, abundance, and harvest totals (Byrne et al. 2015). These population trends have occurred concurrent with hunter requests for earlier opening dates. Although the simultaneous occurrence of these two developments does not necessarily imply a causative

relationship, these population trends have generated concern about the potential effects of spring turkey season timing on turkey population demographics. In light of these concerns, this document seeks to overview biological and sociological considerations associated with the timing of spring turkey seasons. Our objectives are to (1) summarize literature pertaining to factors which should be considered when setting the timing of spring turkey seasons, (2) examine potential undesirable consequences associated with inappropriately timed spring season frameworks, and (3) provide recommendations for state wildlife agencies to consider when setting the timing of spring turkey seasons. Finally, we provide an appendix which summarizes options for opening dates of spring wild turkey hunting seasons with their potentially associated positive, negative, and unknown biological and sociological consequences

Factors to Consider when Setting Spring Turkey Seasons

Although the chronology of turkey gobbling can be influenced by weather (Kienzler et al. 1996, Miller et al. 1997*a*, Norman et al. 2001*a*), the reproductive period is primarily triggered by photoperiod (Healy 1992), and latitude can be used to predict broad regional variation (Whitaker et al. 2005, Palumbo 2010). For turkey populations experiencing little to no hunting pressure, researchers have documented one (Colbert 2013) or two (Bevill 1975) gobbling peaks. These peaks may coincide with breakup of winter flocks (Bevill 1973), initiation of laying behavior (Miller et al. 1997*b*), peak nest initiation (Colbert 2013), or peak nest incubation (Bailey and Rinell 1967, Bevill 1975, Norman et al. 2001*a*). Hunting can affect gobbling activity (Kienzler et al. 1996) and has the potential to obscure its chronology (Bevill 1975, Norman et al. 2001*a*), due to male removal via harvest and/or depression of gobbling activity from hunter presence (Kienzler et al. 1996, Norman et al. 2001*a*, Lehman et al. 2007). Thus, in hunted populations, only one gobbling peak may exist (Kienzler et al. 1996, Miller et al. 1997*b*, Norman et al. 2001*a*,

Colbert 2013). In unhunted southeastern populations, gobbling activity generally peaks from late April (28 April; Bevill 1975) to early May (7 May; Norman et al. 2001*a*). By comparison, gobbling peaks can occur from early (2 April; Miller et al. 1997*b*) to mid-April (12 April; Norman et al. 2001*a*) in hunted populations.

Despite their generally gregarious nature, female turkeys become secretive and avoid other turkeys during the nesting period (Healy 1992). Although they may feed or mate with other turkeys, these activities take place away from the nest (Williams et al. 1974). It takes females approximately two weeks to lay a clutch of eggs (Healy 1992) and early in the egg-laying period, they spend about an hour each day on the nest (Williams and Austin 1988). Continuous incubation takes about 26 days, during which females leave the nest every day or every other day (Williams et al. 1971) to feed, drink, and defecate, with average recesses varying from one (53 min; Green 1982) to two hours (1 hr 50 min; Williams et al. 1971). As such, female turkeys are generally solitary during the incubation period and spend considerably less time than normal with other turkeys throughout the nesting process.

Photoperiod triggers nesting in turkeys (Healy 1992). As with gobbling chronology, broad regional variation in nesting chronology is relatively predictable based on latitude (Whitaker et al. 2005), although weather can cause considerable annual variability (Vangilder and Kurzejeski 1995, Norman et al. 2001*b*). In the southeastern U.S., median dates of initial nest incubation generally occur from late April to early May. In Mississippi, Arkansas, Missouri, Virginia, and West Virginia, mean or median dates of first nest incubation initiation ranged from 22 April – 5 May (Vangilder and Kurzejeski 1995, Miller et al. 1998*b*, Thogmartin and Johnson 1999, Norman et al. 2001*b*). Given the two weeks needed to lay a clutch of eggs (Healy 1992),

average dates of egg-laying initiation in the southeastern U.S. based on these studies would be approximately 9–22 April.

Although average dates of nest initiation are generally similar across the southeastern U.S., annual variability can be great. For example, in Virginia and West Virginia, annual mean incubation initiation dates for first nests ranged 12 days (29 April – 10 May; Norman et al. 2001*b*). In Mississippi, annual median dates of incubation initiation ranged 22 days (12 April – 3 May; Miller et al. 1998*b*). Median annual date of first-nest incubation of adult females in Arkansas showed even greater variation, ranging 25 days (26 April – 20 May; Thogmartin and Johnson 1999), and in Missouri, annual median dates of incubation initiation ranged 29 days (28 April – 26 May; Vangilder and Kurzejeski 1995). Researchers have related this variability to weather (Vangilder and Kurzejeski 1995, Norman et al. 2001*a*) and female body condition (Thogmartin and Johnson 1999), which may shift incubation initiation considerably earlier or later than average in some years.

Potential Biological Consequences of Turkey Season Timing

Survival of adult female turkeys is one of the most important factors determining annual changes in turkey abundance (Vangilder and Kurzejeski 1995, Alpizar-Jara et al. 2001). Therefore, hunting regulations protecting female turkeys from being killed during the reproductive period represent a safeguard against negative effects on population growth. As such, most spring hunting regulations allow harvest of male turkeys, while prohibiting or restricting harvest of female turkeys. While some states within the region permit harvest of bearded female turkeys during the spring hunting season, these turkeys generally represent $\leq 1\%$ of the total spring harvest (Waymire 2013; Isabelle 2015).

Despite regulations designed to protect female turkeys during the spring hunting season, research in some areas of the southeastern U.S. has documented considerable inadvertent or intentional illegal kill of female turkeys by hunters during these seasons (Wright and Speake 1975, Kimmel and Kurzejeski 1985, Williams and Austin 1988, Davis et al. 1995, Norman et al. 2001a). Conversely, studies in other portions of the region suggest illegal female kill during spring seasons is insignificant (Everett et al. 1980, Palmer et al. 1993, Vangilder 1996, Miller et al. 1998a, Wilson et al. 2005). Numerous issues likely influence the degree to which illegal female kill occurs including hunter density (Williams and Austin 1988, Vangilder and Kurzejeski 1995) and pressure (Kurzejeski et al. 1987), habitat fragmentation (Norman et al. 2001a), gobbling activity (Williams and Austin 1988), male turkey density (Williams and Austin 1988), and hunter experience (Vangilder 1996). However, despite complexities associated with these factors, female reproductive status has been demonstrated as one of the most direct determinants of susceptibility to illegal female kill (Miller et al. 1998a). Hens actively involved in the nesting process are less likely to flock with gobblers, minimizing inadvertent kill when gobblers are targeted, and incubating hens remain solitary and concealed, reducing their exposure to illegal kill (Williams and Austin 1988, Vangilder and Kurzejeski 1995). Predictably, higher rates of illegal hen kill have been documented in some areas of the southeastern U.S. when the opening of the spring hunting season occurs before the onset of nesting activities, suggesting hunting seasons that occur prior to this timeframe place hens at greater risk (Norman et al. 2001a). Such risk could be significant to population viability, as modeling studies suggest population growth rates may drop linearly with increases in hen harvest (Alpizar-Jara et al. 2001), and population declines likely occur as female harvest rates approach 10% (Vangilder and Kurzejeski 1995, McGhee et al. 2008).

Due to wild turkey's polygamous breeding system, an underlying assumption of spring turkey seasons is male-only harvest should not negatively impact population growth when its implementation does not disrupt or impede breeding activities (Allen 1956, Healy and Powell 2000). Nonetheless, potential effects of spring season timing on male harvest and its relationship to population vigor are important to consider, especially in areas of low turkey densities, intense hunting pressure, high harvest rates, and fragmented habitats (Vangilder 1992, Kurzejeski and Vangilder 1992, Stafford et al. 1997, Chamberlain et al. 2012). These concerns are based on observations that suggest insufficient availability of adult gobblers can detrimentally impact localized population productivity (Exum et al. 1987, Isabelle et al. 2016). Annual adult gobbler survival can be relatively high, yet most gobbler mortality occurs during spring with hunter harvest often accounting for the bulk of losses (Godwin et al. 1991, Vangilder 1996, Wright and Vangilder 2000). In relation to natural sources of mortality, hunter harvest can be additive for gobblers (Moore et al. 2008), indicating harvest plays a role in governing gobbler availability and distribution. Furthermore, the majority of gobbler harvest may be concentrated early in the spring season under frameworks in which access or opportunity is unrestricted (Miller et al. 1997b, Lehman et al. 2007). These traits are important to consider in regards to the timing of harvest within the breeding season's progression. A recent meta-analysis of turkey nesting phenology (Whittaker et al. 2007) compared the predicted onset of reproductive activities to the opening date for spring gobbler seasons. Most SEAFWA member states opened spring hunting seasons early in the breeding season, prior to the predicted nest incubation date ($\bar{x} = 29.5$ days prior; range 9–47 days prior; Whittaker et al. 2007). If male availability is severely reduced given this timing, the combination of additive harvest concentrated prior to completion of breeding activities could result in insufficient gobblers remaining for copulation with hens,

thereby violating the assumption that spring turkey seasons do not impact reproduction. Though this situation is theoretically possible, it is largely uninvestigated.

Removal of males prior to breeding activities could also cause long-term detrimental consequences to populations if individuals of greater fitness are removed prior to their contribution to reproduction (Harris et al. 2002, Milner et al. 2007). While this potential has not been explored in turkeys, correlates of fitness have been shown to determine participation in the species' breeding season (Bevill 1973, Badyaev et al. 1998), with more dominant turkeys engaging in reproductive activities earlier than subdominants (Badyaev et al. 1996a, Badyaev et al. 1996b). Hunting frameworks occurring before completion of breeding activities could expose these early-engaging, dominant individuals to increased risk of harvest, potentially posing a problem for long-term population vigor (Milner et al. 2007).

Summary and Recommendations

The SEAFWA-WTWG acknowledges tradition and hunter opinions are important and play a role in establishing opening dates for spring turkey seasons. We also acknowledge that beyond biological and sociological considerations, differences in hunter densities, turkey densities, turkey habitat, and management goals are all important considerations state wildlife agencies must factor into setting spring turkey seasons (Norman et al. 2001a). We believe spring turkey hunting seasons should be timed to ensure sustainable harvests while affording quality opportunities for hunters in regards to gobbling frequency and responsiveness to calling.

Nonetheless, we believe it is important to recognize potential consequences of spring turkey season timing. Inadvertent or intentional illegal kill of female turkeys has been documented as a significant issue in portions of the southeastern U.S. (Wright and Speake 1975, Williams and Austin 1988, Davis et al. 1995, Vangilder and Kurzejeski 1995, Norman et al.

2001a). Research suggests the likelihood of illegal female kill is greatest prior to the onset of incubation (Miller et al. 1998a, Norman et al. 2001a). Therefore, in areas where substantial illegal female kill occurs, the relationship between spring season timing and female mortality should be considered when establishing spring season timing. We also believe contemporary research to estimate rates of illegal female kill are needed, as most studies investigating illegal female kill during spring seasons occurred ≥ 20 years ago (e.g., Wright and Speake 1975, Kimmel and Kurzejeski 1985, Williams and Austin 1988).

The effect of male harvest on turkey production remains a considerable knowledge gap. Yet, we believe it imprudent to ignore evidence that suggests excessive, ill-timed spring harvest (Exum et al. 1987) or insufficient adult gobbler abundance (Isabelle et al. 2016) may locally suppress turkey productivity. In fact, many authors (Vangilder 1992, Kurzejeski and Vangilder 1992, Healy and Powell 2000) have warned against potential implications of excessive gobbler mortality on population productivity when it occurs early in the breeding season. While unquantified in turkeys, excessive, selective, or inappropriately timed male harvest has been demonstrated to negatively impact production in a variety of other species (Saether et al. 2003, Sato and Goshima 2006, Milner et al. 2007), suggesting this theory is not unfounded. The long-term genotypic or phenotypic consequences of removing gobblers, particularly individuals which are dominant or most fit, prior to their contribution to reproduction is also unknown, but should be a concern of wise management (Fenberg and Roy 2008). Given these considerations, we believe research assessing the effects of variously timed spring harvest intensities on turkey productivity would be beneficial for managers and would provide information useful in evaluating the appropriateness of spring turkey season timing.

Upon evaluation of the sociological and biological considerations associated with spring turkey season timing, we believe delaying spring turkey seasons until peak egg-laying, defined as the mean date of initial nest initiation, may reduce illegal and inadvertent female kill where it occurs (Norman et al. 2001*a*), while minimizing concerns about the potential effects of male harvest on productivity and sustainability of the resource. We believe this approach to be biologically-sound, while also offering the opportunity for hunters to experience high gobbling activity (Norman et al. 2001*a*), an important component of hunter satisfaction (Vangilder et al. 1990, Thackston and Holbrook 1996, Isabelle and Reitz 2015). We recognize that spring turkey seasons beginning during peak egg-laying (9–22 April; Vangilder and Kurzejeski 1995, Miller et al. 1998*b*, Thogmartin and Johnson 1999, Norman et al. 2001*b*) may not overlap with early gobbling peaks (Miller et al. 1997*b*), which, although variable (Colbert 2013), on average, occur one week earlier (2–12 April; Miller et al. 1997*b*, Norman et al. 2001*a*). As such, managers should consider nesting and gobbling chronology, in conjunction with other factors, when establishing starting dates of spring turkey seasons.

An even more conservative approach to establishing spring season timing is opening seasons during the peak of incubation initiation (Kurzejeski and Vangilder 1992, Healy and Powell 2000). However, later spring season opening dates may lead to dissatisfaction among hunters (Cartwright and Smith 1990, Taylor et al. 1996), especially in southern latitudes where warmer temperatures and vegetative growth are likely to be greater during spring seasons.

Although spring season timing is only one of many factors potentially impacting turkey populations, its true effect remains uncertain. Butler et al. (2015) demonstrated that a framework change that moved Mississippi's opening date earlier was responsible for a subsequent decline in harvest per unit effort by a group of avid spring turkey hunters; however, the causative

mechanism behind the relationship was unclear. In Arkansas, a long-term decline in total statewide harvest reversed following a framework alteration that pushed the spring season's opening date after the peak of nest incubation, but the casual mechanisms for the harvest rebound are likewise uncertain (J. Honey, Arkansas Game and Fish Commission, unpublished data). While these case studies raise interesting questions, we acknowledge that linkages between season timing and declining trends in turkey abundance or productivity have not been clearly documented or quantified. However, we maintain that turkeys are an infinitely valuable public trust resource that deserve a cautious, prudent, and conservative management approach. Thus, we feel that SEAFWA member states should thoroughly evaluate their current spring season timing and adjust frameworks if deemed appropriate. We feel that strong consideration should be given to delaying spring seasons until peak egg-laying. Furthermore, we believe targeted research to reduce the uncertainty associated with the biological effects of spring season timing is warranted and should be made a priority by SEAFWA member states.

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APPENDIX A.

Representative options for opening dates of spring wild turkey hunting seasons and potential positive, negative, and unknown biological and sociological consequences. Framework descriptions (liberal, recommended, and conservative) are theoretical and would vary in calendar date based upon state-specific differences in wild turkey reproductive chronology.

	POTENTIAL POSITIVE FACTORS	POTENTIAL NEGATIVE FACTORS	UNKNOWN & RESEARCH NEEDS
<p>LIBERAL FRAMEWORK <i>Opening date prior to peak egg-laying</i></p>	<ul style="list-style-type: none"> - Acknowledges hunter requests - Maximizes hunter opportunity - Encompasses all peaks in gobbling activity - Reduces inclement weather impacts on hunter success and satisfaction 	<ul style="list-style-type: none"> - Population productivity may be reduced via: - Heightened risk of illegal hen kill - Excessive or selective gobbler mortality possibly impacting turkey reproduction 	<ul style="list-style-type: none"> - Risk of illegal hen kill varies and should be assessed state by state - True impact of early-season gobbler mortality likely variable and currently unquantified
<p>RECOMMENDED FRAMEWORK <i>Opening date concurrent with peak egg laying</i></p>	<ul style="list-style-type: none"> - Reduced risk of illegal hen kill - Diminished risk associated with excessive or selective gobbler mortality - Allows for hunter exposure to secondary peak in gobbling activity - Increased responsiveness of gobblers to hunter calls 	<ul style="list-style-type: none"> - Hunters may miss early gobbling or first peak in gobbling - Requires shorter, more precisely timed frameworks - Some hens may still be at risk of illegal kill 	<ul style="list-style-type: none"> - Same as above, plus: - Uncertain effects on hunter satisfaction - Requires accurate knowledge of local nesting and gobbling chronology
<p>CONSERVATIVE FRAMEWORK <i>Opening date concurrent or following peak nest-incubation</i></p>	<ul style="list-style-type: none"> - Minimized risk of illegal hen kill - Eliminates risks associated with excessive gobbler mortality – all gobblers have become a biologically unneeded surplus 	<ul style="list-style-type: none"> - Occurs late in breeding season resulting in shortest season frameworks - Hunters may miss all gobbling peaks in some years - Warmer temperatures and advanced vegetation becomes problematic to hunters in southern latitudes - Likely requires significant outreach and education for continued hunter buy-in 	<ul style="list-style-type: none"> - Uncertain effects on hunter satisfaction