MISSISSIPPI'S
COMPREHENSIVE WILD TURKEY MANAGEMENT PLAN

MISSISSIPPI DEPARTMENT OF WILDLIFE, FISHERIES, AND PARKS

Mississippi's Comprehensive Wild Turkey Management Plan

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"On account of the high proportion of forest lands, and especially the wide dispersion of natural refuges in the form of swamps, no state has a more favorable chance than Mississippi to produce a large and stable crop of wild turkeys."

—Aldo Leopold, Report on a Game Survey of Mississippi,1929

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Gratitude is also extended to Mississippi's turkey hunters, particularly those who are willing to voluntarily report much of the data presented in Section II of this plan.

The Eastern wild turkey is a cherished and highly pursued game species in Mississippi. Recent data suggests declines in turkey reproduction, hunter success, and total harvests for many areas of the Magnolia State. These trends indicate a need to refocus conservation efforts to ensure the bird's continued abundance. The following document was developed at the request of the Commission on Mississippi Wildlife, Fisheries, and Parks to strategically address issues facing the wild turkey and identify opportunities to work toward its betterment. It is the first of its kind to comprehensively review past achievements in turkey conservation, assess the status and challenges facing the species, and devise objectives and actions to increase the state's flock.

There are seven primary objectives within this plan for the MDWFP and its partners. These are:

1. Provide the priority, capacity, and support necessary to effectively manage Mississippi's wild turkey resource.
2. Collect comprehensive data on wild turkey populations at scales which accurately inform policy decisions and evaluate management actions.
3. Promote, facilitate, and undertake practices that address limiting factors to turkey abundance on public and private lands.
4. Provide turkey hunting opportunities which satisfy hunters and yield quality outdoor experiences.
5. Acquire the best available science to guide wild turkey management.
6. Minimize unlawful exploitation of Mississippi's turkey resource.
7. Increase understanding of wild turkey ecology and management by sportsmen, landowners, and the general public.

Successfully accomplishing this plan's objectives will require a significant dedication of resources within MDWFP and externally by the agency's partners. Nevertheless, the future of the wild turkey will ultimately be decided by the resolve of the state's citizenry. Only through adoption of practices that acknowledge the bird's needs can the gobble of the wild turkey be ensured for the Mississippi of tomorrow.

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INTRODUCTION

The wild turkey is a striking symbol of Mississippi's outdoors. Perhaps more so than any other game species, this noble bird inspires a cult-like enthusiasm among its admirers and fervent dedication by those compelled to rise early on spring mornings to hear its gobble. The conviction of the turkey hunter may have been most closely characterized by famed outdoor writer Tom Kelly when he said, *"I do not hunt turkeys because I want to, I hunt them because I have to….I am helpless in the grip of my compulsion* (Kelly 1973)." A bird with such loyal following and widespread respect deserves the best of the hunting and conservation community.

Long heralded as one of conservation's greatest successes, the wild turkey was saved from impending doom during the last half-century by the dedicated efforts of state wildlife agencies, conservation groups, and hunters. The decades straddling the turn of the 20th century were troublesome for much of eastern North America's wildlife and their habitats. The Deep South's landscape was cleared of its virgin timber. Market hunting and unfettered access to wildlife for subsistence decimated what had previously seemed a never-ending supply of game. The combination of the loss of their forested environments in conjunction with severe overhunting took wild turkeys to the brink of extinction. Just prior to the Second World War, it was estimated only a few thousand wild turkeys still existed in Mississippi.

Luckily, the tide turned. Law enforcement and other legal protections put an end to year-round overhunting. The turkey's woodland habitats eventually grew back and modern forestry's birth as a science ensured that future timber harvests would be sustainable. The Mississippi Game and Fish Commission trapped wild turkeys from the few pockets in which they remained and relocated them elsewhere into suitable habitat. Populations grew. By the 1980's, Mississippi had one of the largest turkey flocks in the nation and was regarded as a top turkey hunting destination. Today, the wild turkey's return to our state's fields and forests enriches the lives of countless Mississippians, yielding hundreds of thousands of hunter man-days each spring, adding deeply to our outdoor folklore and heritage, and even contributing mightily to our state's economy. We are all truly blessed that this majestic bird is back to its former glory.

Despite the successes of the past, the future of the wild turkey in the Magnolia State appears to be at a cross roads. Following decades of expansion, evidence suggests turkey populations throughout most of Mississippi have stabilized or even undergone recent declines. This turning point signals the need for a recommitment to the management of this premier game bird, and marks an opportunity for the Mississippi Department of Wildlife, Fisheries, and Parks (MDWFP) and its partners to rededicate themselves toward the conservation challenges of the 21st century.

The following comprehensive management plan was initiated at the request of the Mississippi Commission on Wildlife, Fisheries, and Parks. The Commission recognized the need to strategically address concerns facing the wild turkey and its management, and charged the MDWFP's Wild Turkey Program with plan development. Wildlife biologists and Conservation Officers from within the MDWFP, along with natural resource professionals from various partner organizations throughout the state, were consulted to identify key issues and provide input on how they should be addressed. The resulting plan is the first all-inclusive roadmap to the wild turkey's statewide management in Mississippi. Where applicable, approaches described herein are aimed to fit within the broader MDWFP Strategic Plan or align closely with the goals of partner organizations, such as the National Wild Turkey Federation's "Save the Habitat. Save the Hunt." initiative.

This plan is divided into four sections. The first briefly summarizes the history of major conservation actions taken on behalf of the wild turkey in Mississippi. The second looks at the current status of turkeys and turkey hunting in our state through an overview of data collected by the MDWFP. The third section discusses several factors which could limit turkey populations and uses available data and expert opinion to gauge the degree these factors may be effecting turkeys in Mississippi. The final section frames the objectives, strategies, and actions that should be undertaken to address Mississippi's wild turkey management needs.

Although this plan is broad in its scope and ambitious in its goals, it is nothing without action. Successfully tackling the plan's objectives will require dedication of resources from within the MDWFP and beyond, steady leadership to ensure that all those with wild turkey interests are working toward common goals, and trust from Mississippi's hunters that the novel approaches advocated within this plan will ultimately be in the best interest of the resource and sportsmen. In the end, however, wild turkeys will only remain firmly interwoven into the fabric of Mississippi's wild lands and outdoor culture if all those who place the bird in high regard take measures necessary to ensure its future. We cannot revel in the achievements of the past and ignore challenges which lay ahead.

SECTION I
HISTORY OF WILD TURKEYS IN MISSISSIPPI

Historically, the southeastern United States held large numbers of wild turkeys. Many early writings describe an abundance of turkeys that were heavily utilized by Native Americans and European explorers. During expeditions in the 1600s, the Spanish explorer Bienville found a *"vast number of turkeys"* along the Mississippi River. Two centuries later, noted naturalist and artist John James Audubon visited the Natchez area and reported a *"plentiful supply of wild turkeys."* Other written accounts suggest turkeys were numerous throughout Mississippi during the 1700s and 1800s (Commer 1987).

By the turn of the 20th century Mississippi's wild turkey population faced serious trouble. Widespread habitat destruction, coupled with a lack of game laws and unsustainable harvest, sent turkey populations to the brink of extinction in the early 1900s. In Game Birds of Mississippi (Cook 1945), Fannye Cook wrote, *"it was between 1900 and 1925 that Mississippi's major forest was felled and much of the home range of the wild turkey was destroyed."* Forest loss was driven by settlement and development and the absence of science-based forest and wildlife management practices caused many native species to suffer.

Cook also noted the wild turkey faced heavy exploitation during this period. She wrote, *"Protective laws were inadequate and generally not enforced. Turkeys were killed wherever they were encountered by cutters and logging men. Those which escaped became easy targets for hunters who were free to hunt when and where they pleased and to take as many turkeys as they could by whatever method they chose* (Cook 1945)*."*

Aldo Leopold, often regarded as the father of modern wildlife management, conducted a game survey of Mississippi in 1928. He too found wild turkeys in serous peril. His report stated, *"Wild turkey are steadily decreasing. They have been cleaned out of the upland ranges, and there is barely a seed stock left in the larger swamps. The factors determining the turkey crop are imperfectly known, but is a safe guess that they are overkilled, legally and illegally. Refuges, education, law enforcement and fact-finding are badly needed* (Leopold 1929)*."*

The Mississippi Game and Fish Commission (now known as the MDWFP) was formed by the Legislature in 1932, with wild turkey restoration as one of its primary goals. Cook was hired as a research assistant in September 1932, and she became very involved in early turkey conservation attempts. While some suitable habitat existed in the 1930s, early efforts to restore wild turkeys were hampered by the difficulties of trapping wild birds. Therefore, the Game and Fish utilized tame and semi-tame, pen-raised turkeys almost exclusively for early stocking purposes. W.H. "Bill" Turcotte, long-time Game and Fish employee who later retired as Chief of Game and Fisheries, was involved in turkey restoration for many years and noted that many of the pen-reared birds came from semi-wild stock and were purchased from David C. Atwood of Kosciusko. In 1941, the Commission conducted a survey which investigated 576 individual releases of 2,743 semi-wild, pen-reared turkeys and found that most of the releases were failures. The survey concluded that most of the successful releases were in areas that held some breeding stock of native wild turkeys and that future restocking efforts should only utilize live-trapped, native wild turkeys (Johnson 1959).

Regarding pen-reared releases, Cook wrote, *"Many of the turkeys received were tame and would not remain in the natural ranges selected. Disease and predators claimed a large percentage of them, but some crossed with native stock and were considered successful…. It is the opinion of experienced conservationists that the introduction of domestic turkeys among wild stock is not a good policy to pursue in restoration programs. Introduced domestic stock are highly susceptible to fowl-house diseases which they transmit to wild birds. Many of them also remain tame, or semi-tame, and influence tameness in wild stock, thus affecting the game qualities of wild birds, and subjecting them to enemies which they are not accustomed to combatting* (Cook 1945)*."* These concerns remain pertinent today and are the rationale behind regulations prohibiting the release of turkeys by private individuals.

In the 1950s, the advent of the cannon-net provided a viable method to capture wild turkeys. The cannon-net was a simple set-up that allowed large nets to be propelled over baited locations by projectiles launched from small mortars triggered by Game and Fish personnel hidden nearby. The technique was effective, and after years of slow progress turkey restoration was soon on the fast track in Mississippi and other states.

Early wild turkey trapping in Mississippi focused on the Leaf River Refuge, Adams County Refuge, Friars Point Refuge (privately owned in Tunica County), Longleaf Farms in Amite County (privately owned by Fred Anderson), and later on Bucatunna, Chickasaw, and Red Creek Wildlife Management Areas. Agency records indicate that 3,674 wild turkeys have been relocated for restoration purposes since 1956 (Table 1), and many MDWFP employees assisted with these efforts. In *The History of Mississippi's Wildlife Monarch, The Wild Turkey,* Malcolm Commer, Jr., quoted Turcotte regarding the role of key turkey trappers, *"The trappers are due a great amount of the credit for the success of the program. Men like Quinton Breland, Hop Birdsong, Wayne Strider, R.M. Freeman, St. Clair Thompson, Carl Howard, Austin Shattles, James Smith, Bert Brooks, James Cotton, Bennie Herring, Champ Clark, Howard Cox, William Cooley, Hoyt Mathis, and Cotton McDonald were indispensable and worked long, patient hours toward our effort* (Commer 1987)*."*

Once the re-establishment phase was sufficiently underway, the state agency launched a research program designed to study wild turkey ecology. On July 1, 1983, the MDWFP partnered with Dr. George Hurst at Mississippi State University (MSU) to initiate the Cooperative Wild Turkey Research Project. Hurst later brought in Dr. Bruce Leopold and others to learn more about wild turkeys in Mississippi at study areas including Tallahala Wildlife Management Area (WMA), privately owned industrial forest lands in Kemper County, and other sites. The goal of this nationally-recognized research effort was to learn how to better manage wild turkeys, and the findings from these studies greatly advanced wild turkey conservation within Mississippi and beyond.

By the mid-1980s, wild turkeys were re-established throughout most of the Magnolia State. The final phase of the restocking era focused on the northern counties of Alcorn, Benton, Chickasaw, Itawamba, Marshall, Pontotoc, Prentiss, Tippah, and Union. By the mid-1990s, the majority of Mississippi was determined to be sufficiently re-stocked with turkeys, with the exception of interior Delta counties where suitable forested habitat was severely limited.

During the 1990s, the MDWFP increased turkey data collection efforts and developed a Wild Turkey Management Program. Several different monitoring surveys were initiated in the mid-90s that allowed for closer inspection of turkey populations; most of which continue through the present. In 1997, Ron Seiss, an agency wildlife biologist, became the first full-time MDWFP Wild Turkey Program Coordinator. Having played a key role in many of the agency's turkey efforts during his time with the MDWFP, the move allowed Seiss to further focus on turkey conservation, and he was responsible for many progressive ideas that are still in play today. For instance, the "no-jake" rule was initiated during the 1998 spring season to increase the availability of adult gobblers, making it illegal for hunters to harvest a juvenile gobbler (Leopold and Cummins 2015).

In 2009, following a series of shorter-duration turkey research projects focusing on individual topics (such as the impact of growing season burning, gobbling activity, etc.), the MDWFP launched another landscape-level research project by teaming up with Dr. Guiming Wang at MSU to evaluate the suitability of the interior Delta for wild turkey restoration efforts. Large acreages of the relatively-open Delta landscape remained mostly void of turkeys, but since the mid-1980s thousands of acres of private agricultural land had been converted back into wildlife habitat by planting hardwood trees and establishing native grass fields through government-led cost-share incentive programs. This research project sought to learn more about the usefulness of young, established hardwood plantings to wild turkeys. During 2009 and 2010, the MDWFP moved 122 radio-tagged wild turkeys into parts of Coahoma and Quitman Counties, and researchers monitored the success and failure of these stockings, as well as evaluating habitat use and movements of surviving birds. While these experimental stockings produced mixed results, findings from these efforts will help direct future restoration efforts in this region as more conservation plantings mature into functional forests.

Recent themes of turkey research between MDWFP and MSU haave sought increased understanding of how turkey populations adapt and function in varying landscapes. Knowledge regarding the far-reaching consequences of broad scale land use is an important aspect of turkey ecology which until now has received insufficient attention. Increasing awareness of how turkeys respond to modern landscapes will be an important component guiding future management.

As of 2016, spring turkey hunting is open in 82 Mississippi counties, and wild turkeys are one of the state's most pursued game species. Turkey hunting is big business and is estimated to have in excess of a $90 million annual statewide economic impact (Henderson et al. 2010). Without question, the restoration of the wild turkey in Mississippi has been one of our state's greatest conservation achievements.

Table 1. *Number of wild turkeys released by county during MDWFP's wild turkey restocking efforts, 1956–2010.*

COUNTY	TURKEYS RELEASED	COUNTY	TURKEYS RELEASED
Adams	40	Lincoln	0
Alcorn	55	Lowndes	81
Amite	14	Madison	68
Attala	73	Marion	0
Benton	17	Marshall	53
Bolivar	10	Monroe	64
Calhoun	50	Montgomery	42
Carroll	73	Neshoba	24
Chickasaw	41	Newton	30
Choctaw	36	Noxubee	46
Claiborne	31	Oktibbeha	0
Clarke	23	Panola	95
Clay	22	Pearl River	0
Coahoma	87	Perry	0
Copiah	9	Pike	8
Covington	26	Pontotoc	84
DeSoto	45	Prentiss	120
Forrest	2	Quitman	157
Franklin	9	Rankin	66
George	15	Scott	9
Greene	3	Sharkey	55
Grenada	87	Simpson	15
Hancock	0	Smith	15
Harrison	16	Stone	45
Hinds	30	Sunflower	18
Holmes	78	Tallahatchie	110
Humphreys	84	Tate	18
Issaquena	106	Tippah	119
Itawamba	83	Tishamingo	73
Jackson	16	Tunica	0
Jasper	31	Union	73
Jefferson	62	Walthall	41
Jeff Davis	11	Warren	62
Jones	0	Washington	15
Kemper	0	Wayne	77
Lafayette	115	Webster	29
Lamar	23	Wilkinson	51
Lauderdale	0	Winston	11
Lawrence	27	Yalobusha	32
Leake	54	Yazoo	38
Lee	72	N/A	179
Leflore	75	Total	3,674

SECTION II
CURRENT STATUS OF WILD TURKEYS IN MISSISSIPPI

Estimating the number of wild turkeys in Mississippi is difficult. Many techniques have been explored, but mark-recapture studies of banded birds have been shown to be the only reliable way to directly determine the abundance of Eastern wild turkeys. To implement such an approach at a statewide scale would be logistically impractical and extraordinarily expensive. Given these constraints, the MDWFP employs a variety of surveys to monitor parameters that influence abundance (e.g., reproduction and recruitment) or are a function of abundance (e.g., harvest). Additionally, MDWFP annually estimates the number of resident and nonresident turkey hunters, as well as metrics associated with hunting, such as hunter effort. The following section discusses trends in these indices.

Annual Hunter Harvest Survey

The annual post-season hunter harvest survey is the MDWFP's primary means of estimating hunting participation and the total harvest of migratory and resident games species, including wild turkey. Although the agency conducted statewide harvest surveys sporadically as early as the 1950s, the survey was not implemented as an annual project until 1980. The survey's intent is to provide the MDWFP with estimates of total harvest, average seasonal harvest per hunter, average daily harvest per hunter, man-days spent afield, percent successful hunters, and the proportion of hunters pursuing particular species. Initially this survey was only directed at licensed resident hunters, but beginning in 1994 licensed nonresidents were also included. On average, approximately two to four thousand licensed hunters are randomly selected to participate in this survey each year. Hunters exempt from purchasing a hunting license are not included in the survey.

Mississippi's first statewide spring harvest estimate was 249 gobblers in 1951 (Figure 1). During the 1970s, licensed harvest grew exponentially, and peaked near 60,000 gobblers in 1987. Total harvest then fell, stabilizing around 1992. From that point until the mid-2000s, licensed harvest remained relatively flat to slightly increasing, averaging between 30 to 35 thousand gobblers per year. Beginning in 2005, total licensed harvest began to decline, falling at an average rate of 4% per year. The 2015 harvest was the lowest since 1977 (Figure 1).

Although the annual harvest survey does yield estimates of statewide turkey harvest, it has several shortcomings. First, given sample size limitations the survey can only provide a marginal estimate of harvest at the regional level within the state, and is incapable of providing estimates at the county level. Secondly, because the annual hunter harvest survey only includes license holders, harvest by hunters exempt from purchasing a license (e.g., youth, landowners, ages ≥65 years) is not included, and therefore the estimated total harvest may not reflect actual harvest if the proportion of exempt hunters changes through time. In other words, declines in total harvest may simply track declines in the number of licensed hunters who pursue turkey each spring, rather than actual turkey numbers (Byrne et al. 2015). Figure 2 illustrates this relationship by comparing estimates of total turkey harvest by resident hunters with total number of resident turkey hunters. For most of the past 35 years, these two values have aligned closely.

Due to correlation between total licensed hunters and total licensed harvest (Figure 2), use of harvest per unit of effort (HPUE) is a standardized and more reliable way of understanding the relationship between turkey abundance and harvest (Byrne et al. 2015). Using these estimates from the annual hunter harvest survey illustrates that until the last five years, the percentage of hunters who successfully harvested at least one spring gobbler per season has remained consistently near 50% (Figure 3). Since 2011, this value has plummeted, with only 31.5% of turkey hunters successfully harvesting at least one gobbler in 2015. Days hunted per harvest, a measure of HPUE, shows a much more long-term increase (Figure 3). When considered in conjunction with total harvest and total hunter numbers, declines in HPUE are suggestive of declines in either hunter efficiency or the abundance of gobblers, or both. In this instance, HPUE supports conclusions drawn from total harvest, which is Mississippi's turkey population experienced declines during the late 1980s and early 1990s, and then again over the last five to ten years.

Spring Gobbler Hunting Survey

Recognizing the annual hunter harvest survey's limitations, the MDWFP implemented a survey of avid turkey hunters in 1995. Unlike the annual hunter survey, participants in the Spring Gobbler Hunting Survey (SGHS) are not randomly selected. Instead, the MDWFP advertises the opportunity in a variety of outlets, and encourages all interested hunters to participate. Given the nonrandom selection of SGHS participants, the data they report may not represent the average Mississippi turkey hunter, however, any biases associated with the survey are likely consistent through time. Data collection materials are sent out to approximately 1,200 turkey hunters each spring, and data is annually returned by 400 to 600 participants, representing thousands of individual turkey hunts. This data allows MDWFP to track parameters such as HPUE, gobbling activity, turkey observations, and qualitative information about harvests (e.g., age structure). Survey participation

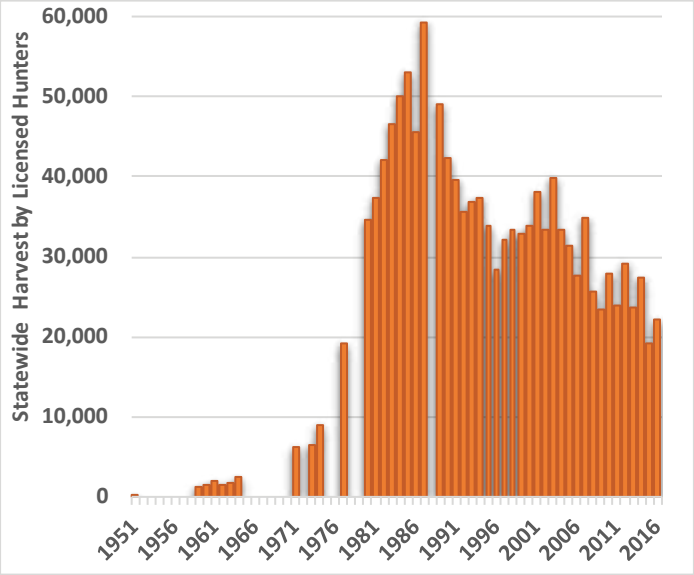


Figure 1. *Estimated total spring gobbler harvest by licensed hunters in Mississippi, 1951–2016.*

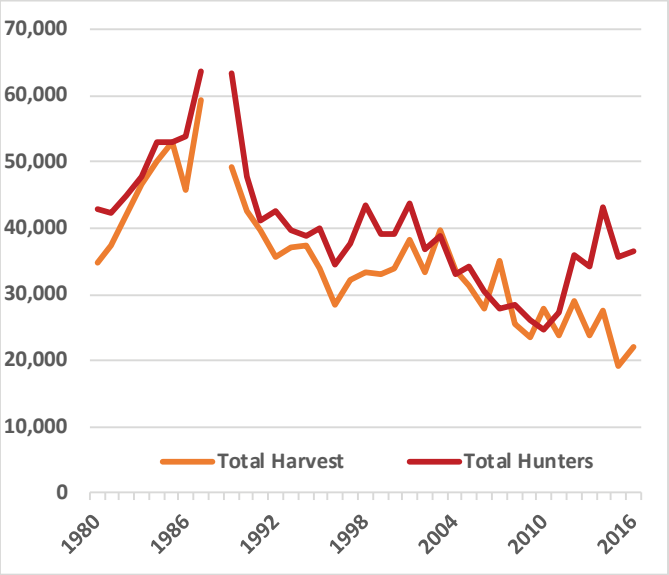


Figure 2. *Estimates of total licensed resident spring turkey hunters and total spring gobbler harvest by licensed resident hunters in Mississippi, 1980–2016.*

is adequate to give reasonable estimates of these parameters at statewide and regional scales, but is insufficient to accurately assess these measures at county levels.

Spring Gobbler Hunting Survey - Statewide Summary

One of the most useful measurements from the SGHS is harvest per 100 hours hunted, a measure of HPUE. Statewide, Spring Gobbler Hunting Survey HPUE peaked in 2004, when hunters harvested approximately 4.7 gobblers per 100 hours hunted (Figure 4). The 2015 value for this metric, 2.5 gobblers per 100 hours hunted, was the lowest since the survey's inception. In general, SGHS hunter HPUE has exhibited a long-term decline (Figure 4), although this value can loosely be divided into a pre- and post-2005 timeframe. Prior to 2005, HPUE was flat, and averaged 4.1 gobblers harvested per 100 hours hunted. Since 2005, gobbler harvests have averaged 3.2 per 100 hours hunted. This would suggest that fewer gobblers have been available for harvest since 2005. However, this assumption is confounded because the spring season was lengthened in 2005, and a recent study suggests that this extension may have played a role in decreasing HPUE (Butler et al. 2015). The mechanism causing the season extension to diminish HPUE is unclear.

Statewide gobbling activity heard by SGHS hunters suggests a relatively stable gobbler flock. The number of individual gobblers heard statewide by SGHS hunters peaked at 6.6 gobblers per 10 hours hunted in 2004, whereas overall gobbling activity was at its highest in 2012 when hunters heard 93.7 gobbles per 10 hours hunted (Figure 5). Both individual gobblers and total gobbles heard exhibited a growing trend through the early 2000s, and after a slight decline, have remained stable.

Turkey observations by SGHS hunters also suggest long-term population stability. Total statewide turkey observations peaked in 2004 at 106 turkeys observed per 100 hours hunted. The overall trend since 1995 has been one of ups and downs fluctuating around an average of approximately 85 turkeys observed per 100 hours hunted. Total observations slipped substantially from 2013 to 2015, with the 2015 value being nearly 25% below the long-term average (Figure 6).

Spring Gobbler Hunting Survey - Regional Summaries

Spring Gobbler Hunting Survey data is summarized regionally based on the Wild Turkey Program's five wild turkey management regions (Figure 7). These regions loosely correspond to differing physiographic areas or major habitats which may influence the abundance and/or distribution of turkeys.

Since 1995, long-term trends in harvest per 100 hours have declined in four of five turkey regions (Figure 8). Harvest rates have remained stable in the Northeast Region, and have declined sharpest in the Southeast and Delta regions (Figure 8). Unlike harvest rates, observation rates of total turkeys per unit of hunting effort differ between management regions (Figure 9). Direct comparisons of turkey observations between management regions is not recommended due to terrain differences that influence turkey visibility. Instead, this information is best interpreted by tracking observations within a region through time. Since 1995, total turkey observations by SGHS participants have generally increased in both the Northeast and Delta regions (Figure 9). Conversely, total turkey observations have fallen since the early 2000s in the East-central and Southeast management regions (Figure 9). After growing during the late 1990s, turkey observations in the Southwest region have remained relatively stable (Figure 9).

Long-term values for the number of individual gobblers heard have remained stable to increasing in all five turkey management regions (Figure 10). The Southwest region has consistently produced the greatest number of gobblers heard as compared to other regions. The region's long-term trend is slightly increasing, although gobblers heard peaked in 2004 (Figure 10). Gobbling activity in the Delta region faltered

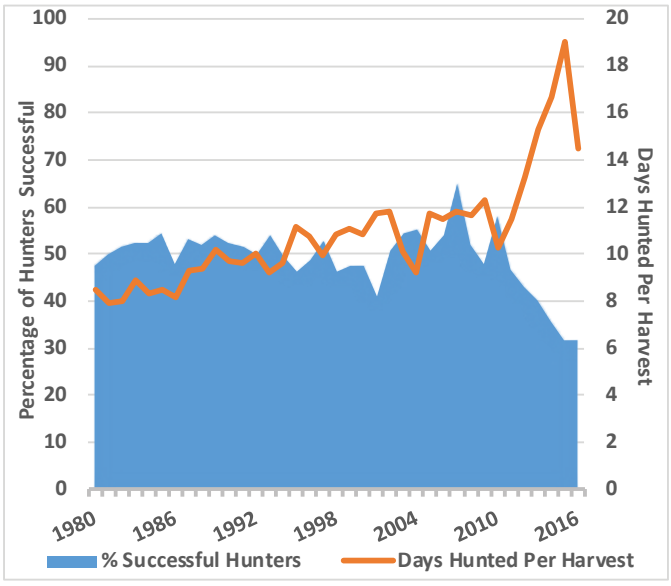


Figure 3. *Estimates of the percentage of hunters that successfully harvested at least one spring gobbler (left axis) with the average days of hunting needed to harvest a gobbler in Mississippi (right axis), 1980–2016.*

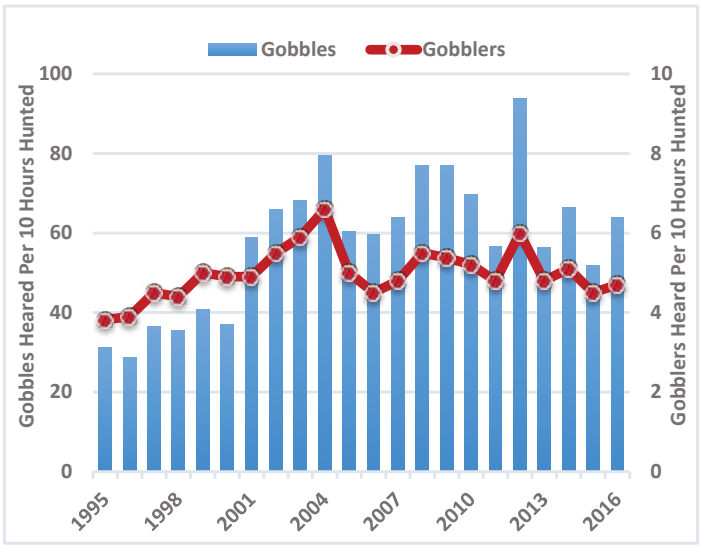


Figure 5. *Total gobbles (left axis) and individual gobblers (right axis) heard per 10 hours hunted by Spring Gobbler Hunting Survey hunters statewide, 1995–2016.*

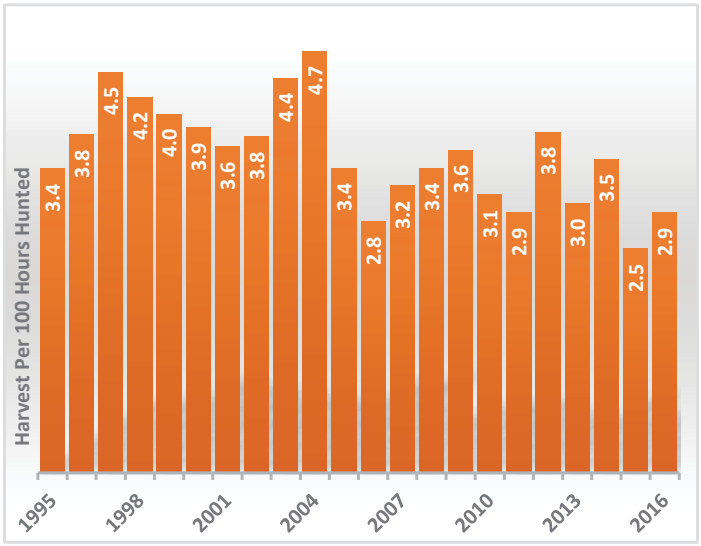


Figure 4. *Statewide gobbler harvest per 100 hours hunted for participants in the annual Spring Gobbler Hunting Survey, 1995–2016.*

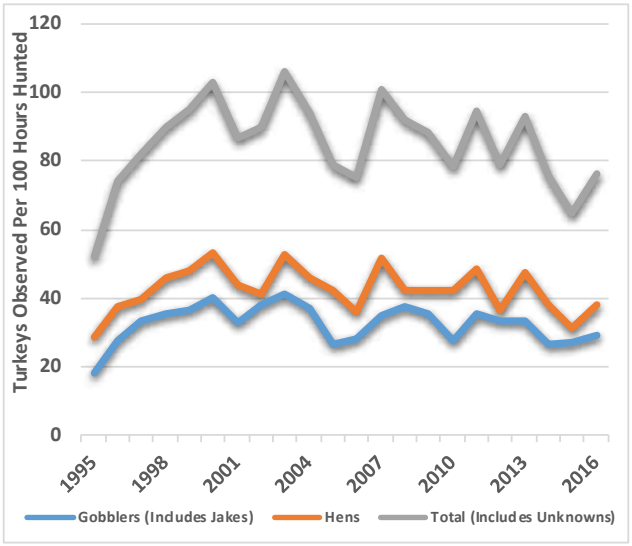


Figure 6. *Trends in observations of gobblers, hens, and total turkeys per 100 hours hunted by statewide Spring Gobbler Hunting Survey participants, 1995–2016.*

during 2010-2013, likely because of spring flooding impacts to population production, but these years notwithstanding, the trend within the region is flat (Figure 10). The long-term number of gobblers heard has also been flat to slightly increasing in the Northeast, East-central, and Southeast turkey management regions (Figure 10).

Comparisons among different metrics of SGHS data suggest conflicting views about the state of Mississippi's turkey population. Harvest data would suggest that turkey populations are declining in all but the Northeast region, whereas, observation data suggests turkey numbers have declined only in the East-central and Southeast. Alternatively, the number of individual gobblers heard by hunters has remained stable to slightly increasing since the SGHS's inception. When taken together, these summations would suggest that turkey populations have likely remained most stable in the Northeast and Southwest regions. Based on observation and harvest rates, populations have declined in both the East-central and Southeast regions, although the numbers of gobblers heard suggests differently. Data for the Delta region is most conflicting of all, with turkey observations increasing dramatically, while hunter harvest rates show steep declines and the numbers of gobblers heard remained flat.

Conclusions from SGHS data should be viewed cautiously given the way in which participants within the survey are selected. Most hunters who enroll in the SGHS are very passionate about turkey hunting, so it is likely that they seek out high-quality hunting opportunities and avoid hunting zones which do not produce the desired experiences. As such, it could be argued that SGHS data is biased, and may mask the full extent of population declines, if and when they do occur. Observational data, such as the SGHS, is least biased when observers and locations remain consistent through time. Unfortunately, this is not the case, and so inferences about population trends from the SGHS are imperfect.

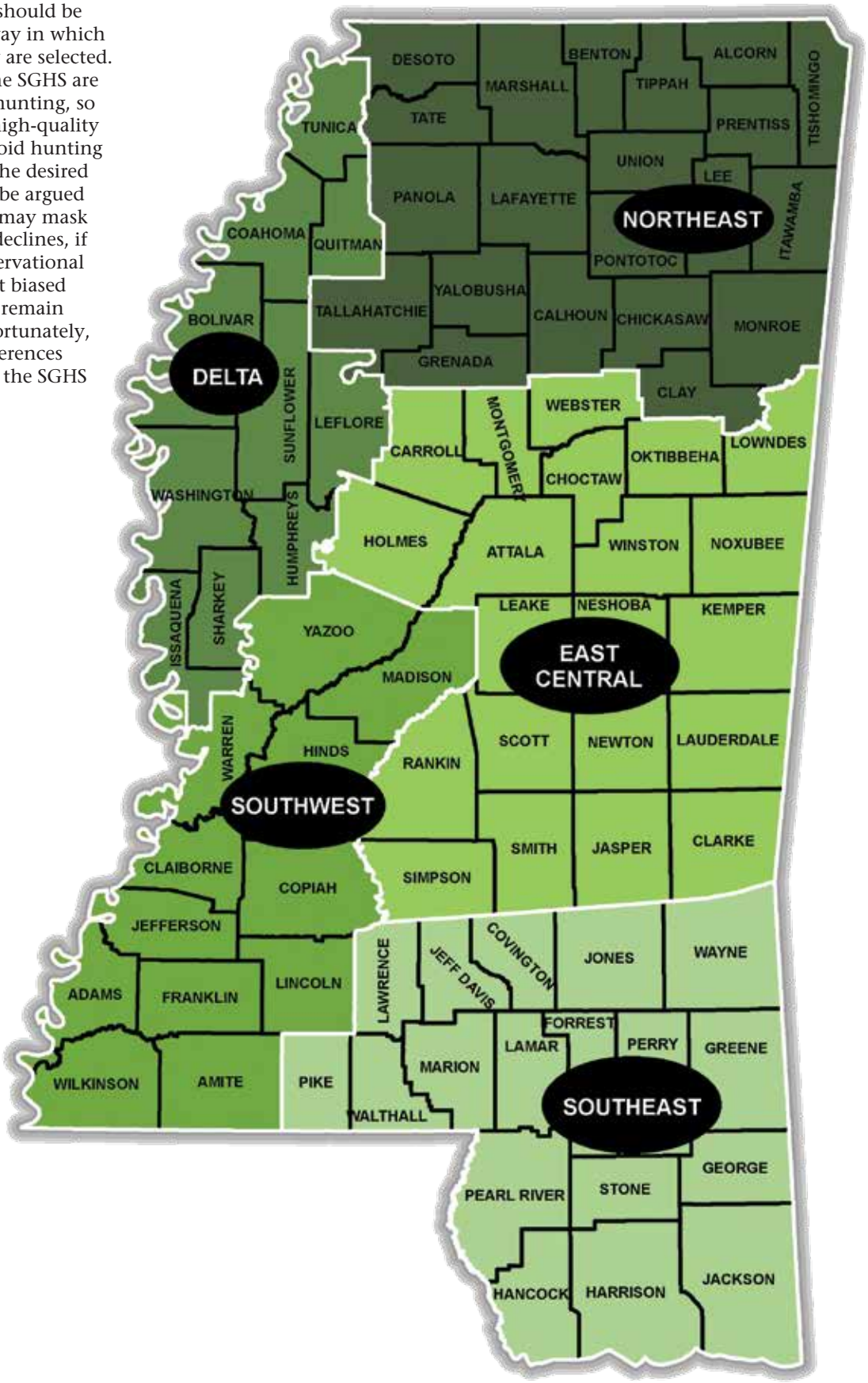


Figure 7. *Mississippi Department of Wildlife, Fisheries, and Parks wild turkey management regions.*

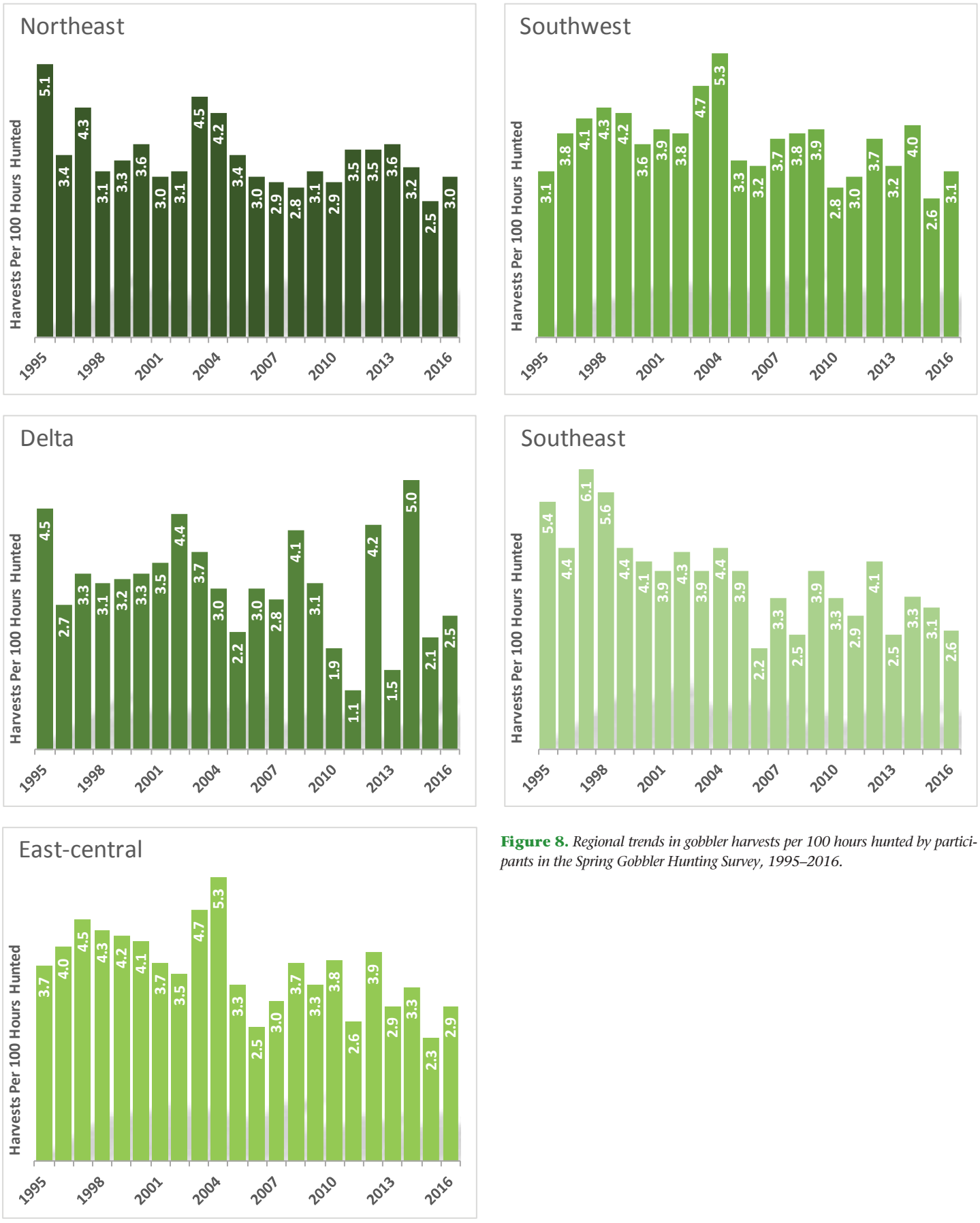


Figure 8. *Regional trends in gobbler harvests per 100 hours hunted by participants in the Spring Gobbler Hunting Survey, 1995–2016.*

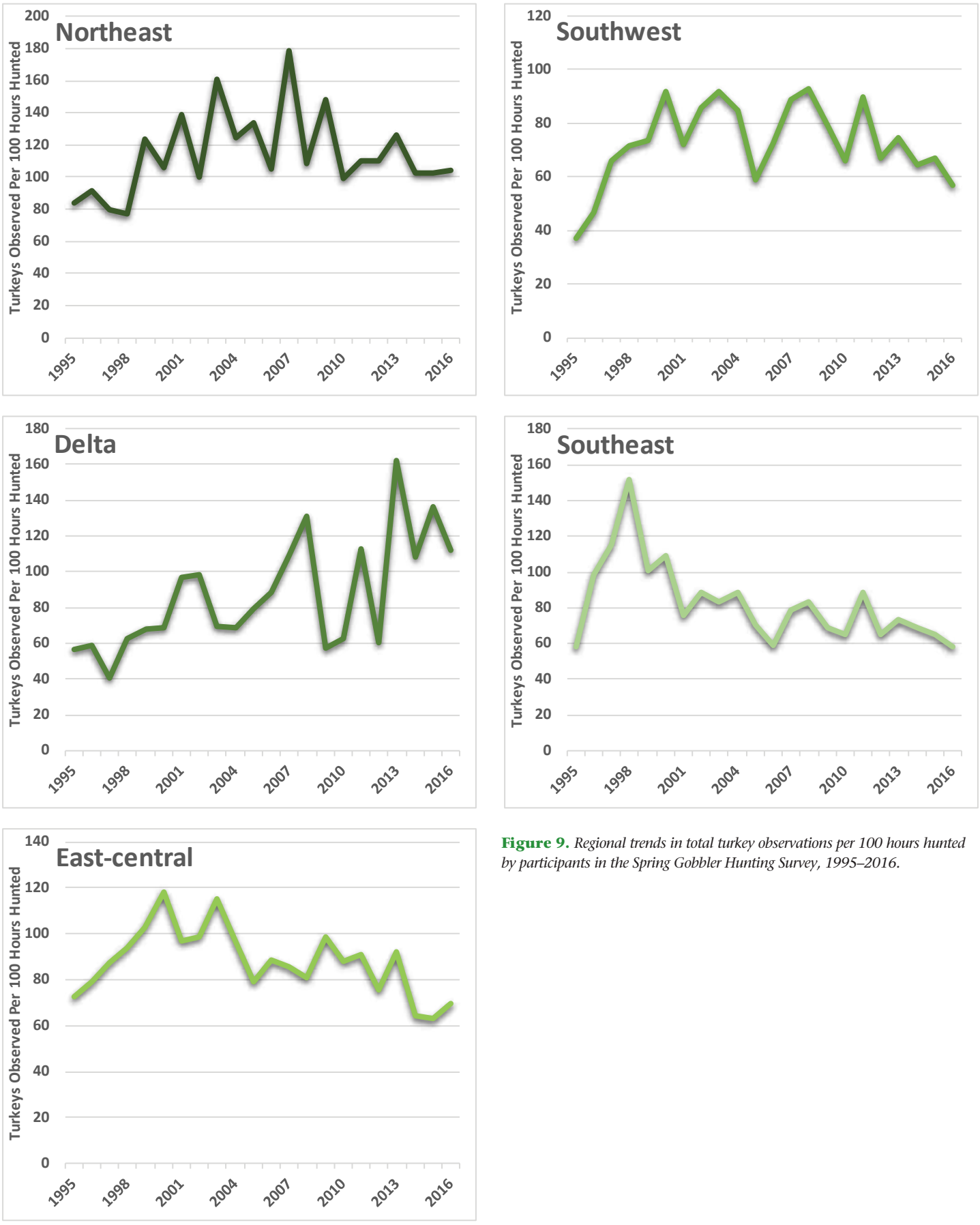
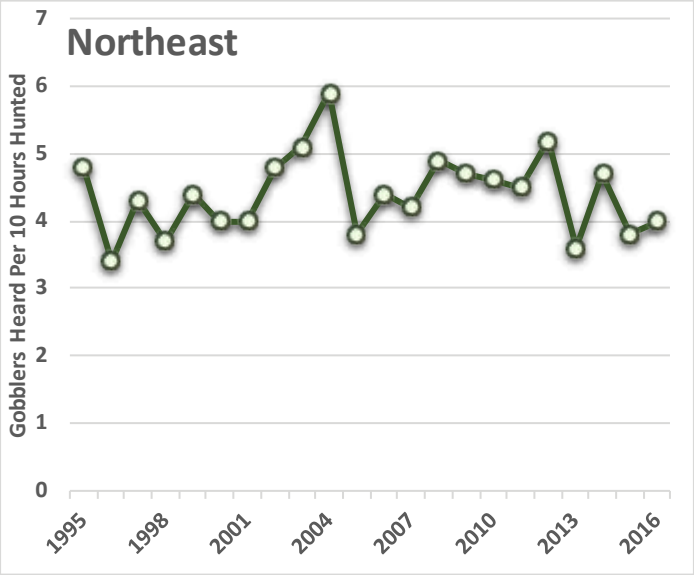
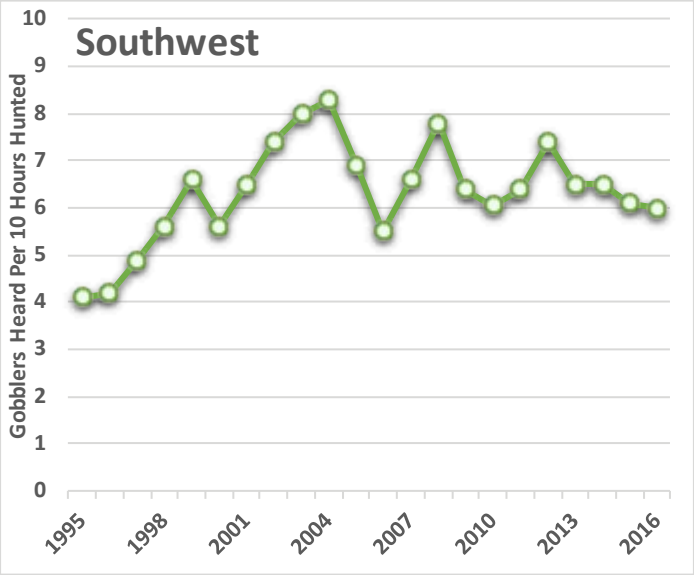
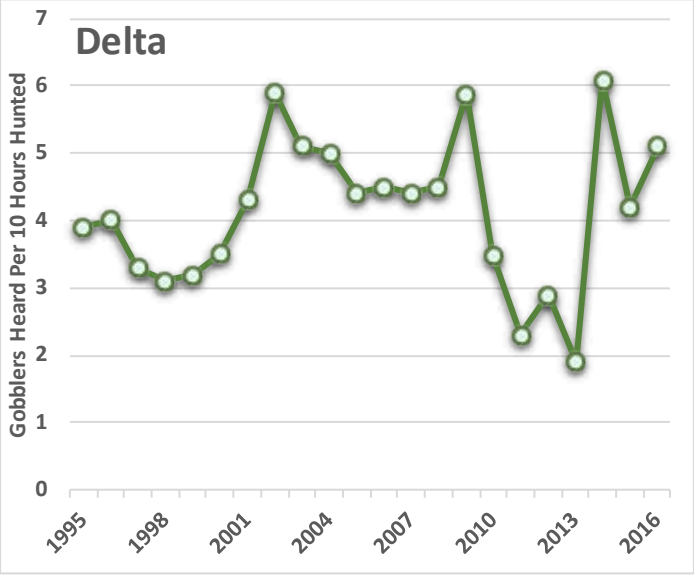
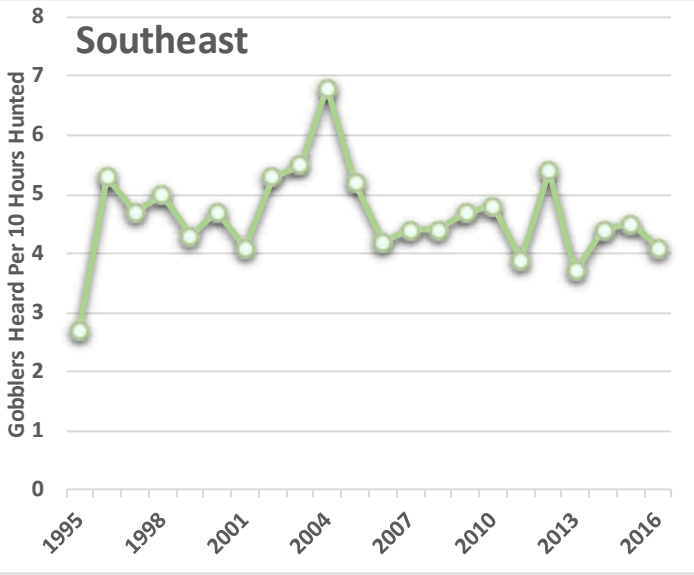


Figure 9. *Regional trends in total turkey observations per 100 hours hunted by participants in the Spring Gobbler Hunting Survey, 1995–2016.*









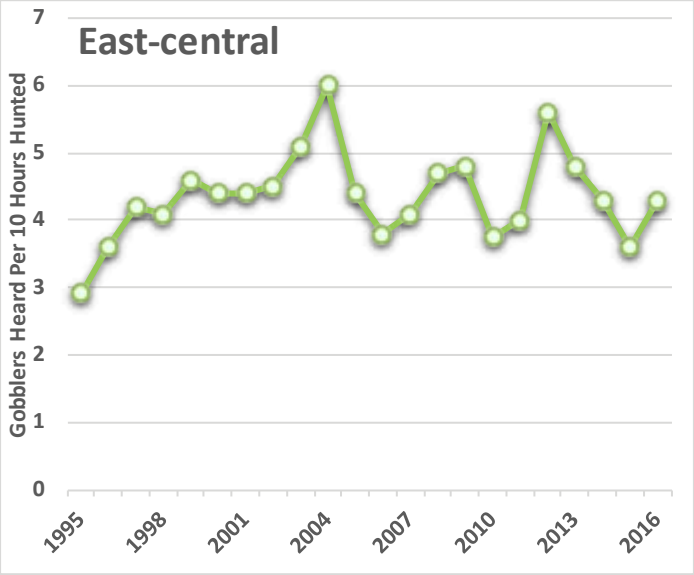


Figure 10. *Regional trends in the number of individual gobblers heard per 10 hours hunted by participants in the Spring Gobbler Hunting Survey, 1995–2016.*

Wild Turkey Brood Survey

In 1994, the MDWFP initiated an annual survey of turkey reproduction. This survey enlists observers from MDWFP field staff, biologists, and Conservation Officers, along with personnel from partner organizations such as the Mississippi Forestry Commission, U.S. Forest Service, U.S. Fish and Wildlife Service, and the forest products industry. The "brood survey" is conducted during the months of June, July, and August. Survey cooperators record opportunistic sightings of turkeys during field duties conducted through the survey period. Several important reproductive metrics are summarized from the data. Statewide and regional reproductive indices are calculated by dividing the total number of poults observed by the total number of hens observed. This value, known as Poults per Total Hens (PPH), takes successful hens, unsuccessful hens, and poult survival into a single parameter. Other useful indices attained from the brood survey are the percentage of hens with poults and average brood size.

Brood Survey Statewide Summary

Long-term statewide PPH values have decreased at an average rate of 2% per year (Figure 11). However, a more careful look reveals from the mid-1990s until the early 2000s, statewide reproduction values remained relatively stable and averaged 2.24 PPH. Values began to drop beginning in 2003 and have since averaged 1.61 PPH. The lowest statewide reproductive value, 1.03 PPH, was recorded in 2013. Long-term declining trends, which have exacerbated since the early 2000s, have been noticed in many other Southeastern states (Byrne et al. 2014a).

Although both the proportion of successful hens (i.e., those observed with young) and poult survival (i.e., average brood size) both influence total productivity, it appears the former has more influence on declining PPH values (Byrne et al. 2015). The average proportion of hens observed with poults decreased from near 60% in the middle 1990s to below 40% during the 2010s (Figure 12). The average size of broods with one identifiable hen has declined less dramatically (Figure 13) than the proportion of hens without poults (Figure 12).

Brood Survey Regional Summaries

While statewide summarizations of brood data suggest wild turkey reproduction has been in decline for at least a decade in Mississippi, regional summarizations reveal more complexity and significant variation. Poult Per Hen ratios have fallen most steeply (~4% per year) in Northeast Mississippi (Figure 14). Similarly, the Southeast region has experienced declines in reproductive values, with a 3% average annual drop in PPH values. East-central Mississippi has also exhibited declining PPH ratios, although less steeply. Conversely, the long-term trend in PPHs has remained stable for the Southwest and Delta regions (Figure 14).

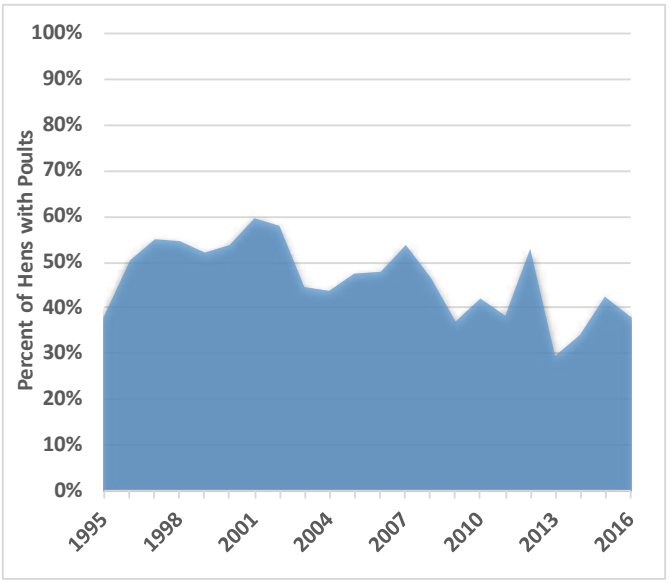


Figure 12. *Percentage of hens observed with poults in Mississippi based on the MDWFP's summer wild turkey brood survey, 1995 – 2016.*

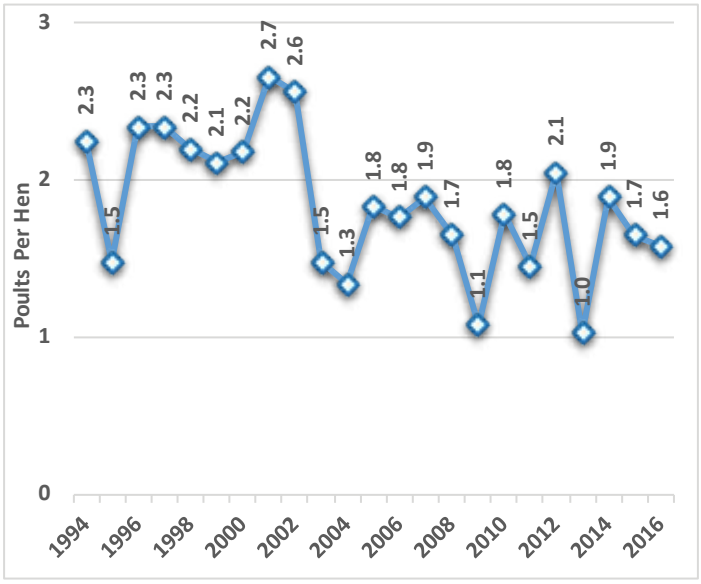


Figure 11. *Statewide ratio of poults observed per hen observed during the MDWFP summer wild turkey brood, 1994 – 2016.*

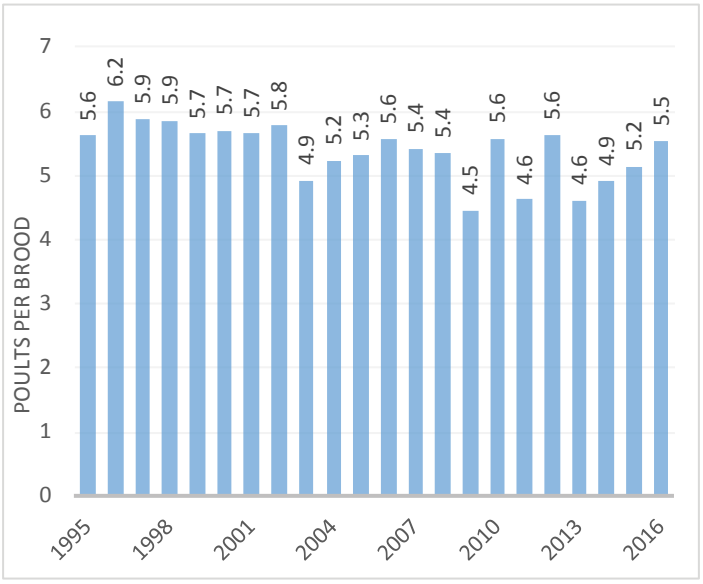


Figure 13. *The average number of wild turkey poults per brood for broods accompanied by only one adult hen. Based on data from MDWFP summer wild turkey brood survey, 1995–2016.*

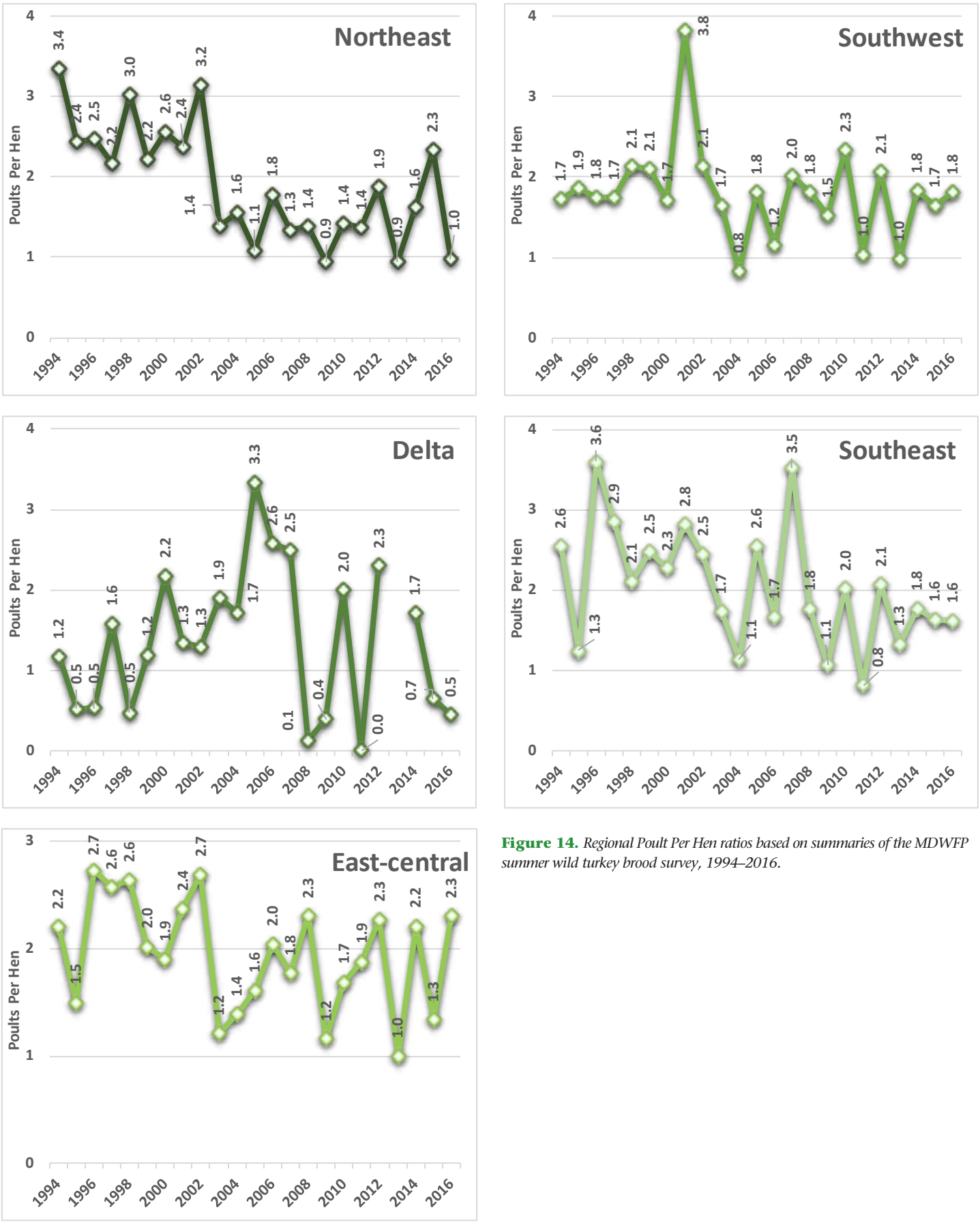


Figure 14. *Regional Poult Per Hen ratios based on summaries of the MDWFP summer wild turkey brood survey, 1994–2016.*

Wildlife Management Area Hunter Data

Harvest of wild turkey and other games species are tracked on public Wildlife Management Areas (WMAs) managed by MDWFP via mandatory hunter check-in and harvest reporting on daily user permits. Total WMA harvest peaked in 1987, when 1,164 gobblers were taken on MDWFP WMAs (Figure 15). Since 1982, statewide WMA gobbler harvest has exhibited a declining trend (approximately 2% per year), with year to year variation. Meanwhile, turkey hunting man-days on WMAs has risen substantially through time, with a low of 9,478 man days in 1985, to a high of 23,590 man days in 2005.

Trends in WMA turkey harvest can also be investigated on a per-acre basis. Total gobbler harvest has been shown to be a reasonable index to gobbler populations, but because total acreage within the WMA system has not remained constant through time, viewing total harvest trends on a per acre basis provides a more standardized way to assess the relationship between harvests and populations.

Since 1983, acres per gobbler harvested has trended upward for WMAs in four of MDWFP's five wild turkey management regions (Figure 16). Assuming hunter compliance with data collection has remained constant, the increasing number of acres per harvest would be suggestive of declining turkey populations on WMAs in these regions. Closer inspection of the trends in these four reflect patterns similar to statewide annual hunter harvest data (Figure 1), in which gobbler harvest (and likely turkey population) declined during the late 1980s to early-1990s, remained stable for a period, and then began to decline again over the last five to ten years. The extraordinary increase in acres per gobbler harvested for WMAs in the Delta beginning in 2010 (Figure 16) is likely the result of springtime flooding and its consequences to turkey reproduction and the MDWFP's subsequent alterations to season frameworks on several of those areas.

Wildlife Management Areas in the Northeast region have exhibited long-term decreasing trends in acres per gobbler harvested (Figure 16), suggesting the turkey population increased over the last 32 years, with growth leveling during the early 2000s. Generally, the Northeast region was the last portion of the state to be restocked by the MDWFP, with restocking efforts occurring into the 1990s. Therefore it is unsurprising that the turkey populations on WMAs in this region grew significantly over this timeframe, and did not appear to reach capacity until the early 2000s.

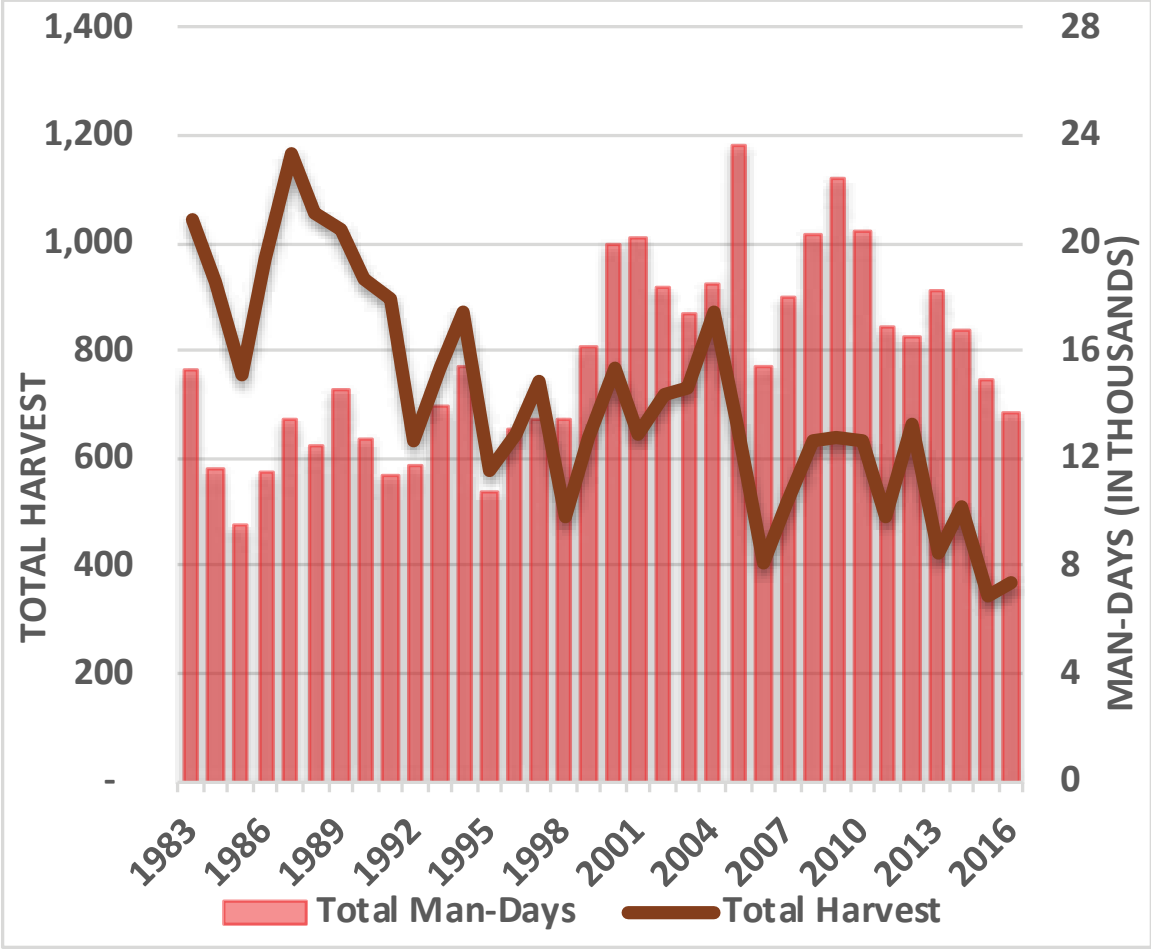
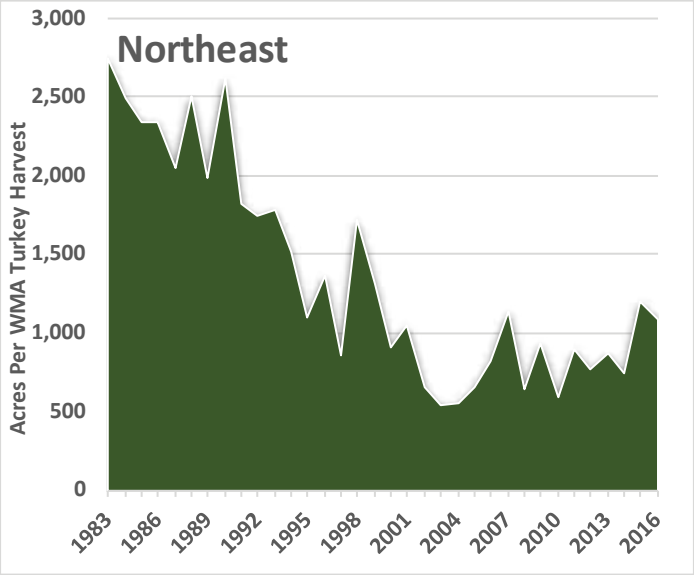
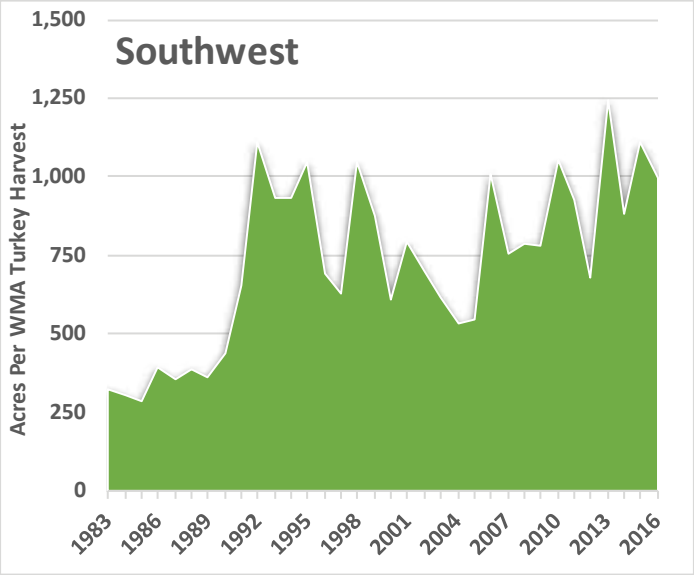
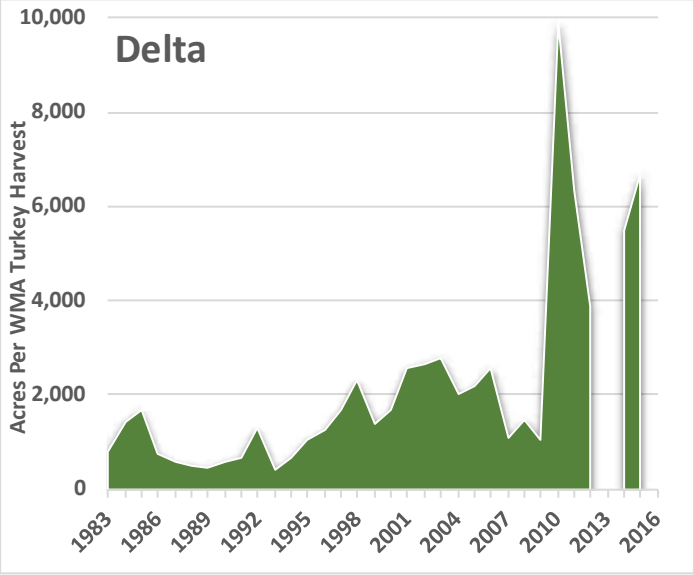
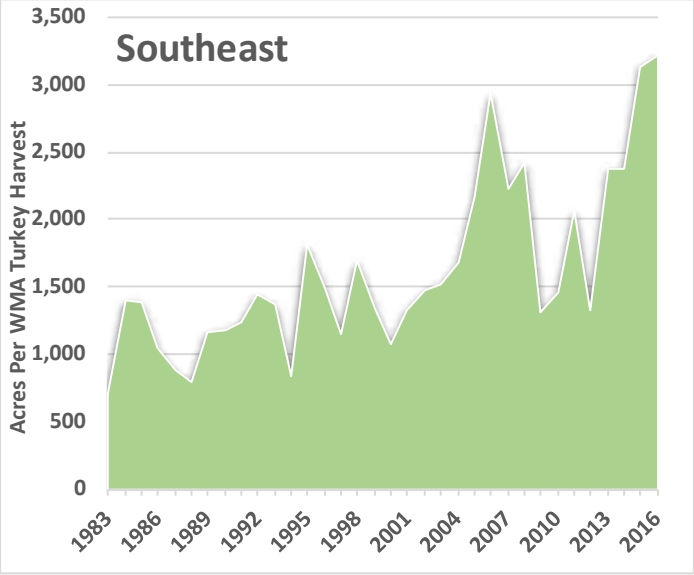


Figure 15. *Total statewide spring gobbler harvest and turkey hunter man-days from MDWFP Wildlife Management Areas, 1983–2016.*









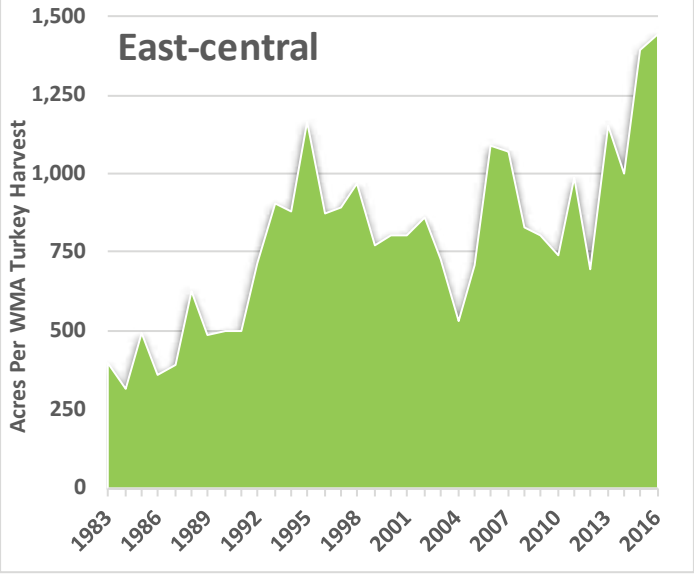


Figure 16. *Average acres per gobbler harvest for Wildlife Management Areas in five wild turkey management regions, 1983 – 2015.*

SECTION III
CHALLENGES TO WILD TURKEYS IN MISSISSIPPI

Trends in wild turkey populations do not occur in isolation. The bird's abundance is an artifact of its environment and the level at which its population is managed. As with many other game species, human land use determines habitat availability, predation shapes population trajectories, and diseases can periodically reduce population vigor. Furthermore, legal and illegal harvest can influence the annual availability of gobblers. The influence of these broad categories must be judged in order to determine the proper course of management. The following section discusses these and other challenges to the wild turkey in Mississippi, first by reviewing scientific literature and status for several potentially limiting factors, and then through summaries of focal group meetings with practicing natural resource professionals from across the state who were willing to share opinions on the most pressing issues they believe turkey populations face.

Limiting Factors to Wild Turkey Populations

Few wildlife species have been studied as intensively as the wild turkey. A significant understanding of the wild turkey's biology and requirements has been developed through numerous field investigations. These studies have shown the bird can flourish when its needs are met. However, when conditions are insufficient, populations decline and eventually only persist in low abundance. This section reviews several factors which may limit turkey abundance.

Wild Turkey Habitat

Wild turkeys inhabit a variety of habitats including bottomland and upland hardwood forests, natural pine or mixed pine-hardwood forests, intensively managed pine plantations, pasturelands, and agriculturally-dominated landscapes (Porter 1992, Hurst and Dickson 1992). The components of wild turkey habitat are distinct during specific life phases; adult wild turkeys prefer relatively open habitats and mature forests most of the year, whereas early-successional, shrub-scrub, and herbaceous covers are needed for nesting and raising young (Porter 1992). Interspersion of differing habitats is necessary to ensure all the bird's annual needs can be met. Beyond landscape-level diversity, mature hardwood availability is an important predictor of abundance. Recent studies have demonstrated that turkeys are most numerous where hardwoods comprise approximately one third of the landscape and interspersion of various other habitats is high (Davis 2016).

Assessing the relationship between turkey populations and the statewide availability of the various components of turkey habitat is difficult. However, data is available regarding the composition of Mississippi's landscape, particularly of its forests. The U.S. Forest Service has periodically inventoried Mississippi's forests as part of its nationwide Forest Inventory and Analysis (FIA; Smith 2002). Reports are produced from these surveys at roughly 10-year intervals that can illustrate the state of Mississippi's woodlands. These data indicate total forest acreage has increased in Mississippi over the last 40 years, from 16.7 million forested acres in 1977 to 19.3 million in 2013 (Table 2, Figure 17). In general, increases in forest acreage has been driven by large expansion of loblolly pine dominated forests. Statewide acreage of this forest-type has increased from 4.2 million acres in 1977 to 7.3 million in 2013. Acres of oak-pine mixed forests have declined since 1977, primarily following a sharp decrease from 1994 to 2006 (Table 2, Figure 17). Oak-hickory type forests increased from 1977 to 1987, but have decreased since (Table 2, Figure 17). Timberland composed of natural stands has decreased since 2006, while artificially regenerated forests increased. For example, pine plantation acreage increased sixfold since 1977 (Table 2, Figure 17; Oswalt 2015).

Conclusions from FIA data suggest changes which may have had implications for turkeys. Mississippi has become increasingly timbered, and much of the forest gain came from afforestation of non-forest landcovers (e.g., agriculture, pastureland, etc; Oswalt 2015). For turkeys, increased forest area generally corresponds to increased habitat suitability (Davis 2016), but in this case forest increases came at the expense of non-forest habitats that can be important for foraging and brood rearing (e.g., primarily pastureland, ag fields, and other openings; Hurst 1998). Furthermore, the composition of Mississippi's forests has subtly shifted in ways meaningful to turkeys. Since 1987, pine forest-types have increased dramatically in timberland extent. Loblolly pine dominated forests have grown by more than one million acres in all FIA regions except the Delta. In the FIA north and central regions, this increase has approached two million acres (Figure 18). This growth has been driven by artificially regenerated plantations. Meanwhile, since 1994, natural stands composed of mixed oak-pine, oak-hickory, and to a lesser extent the bottomland hardwood group (oak-gum-cypress), have decreased in extent outside the Delta (Figures 17 and 18). Pine plantations can provide quality turkey habitat, but typically demand more concentrated management compared to the aforementioned forest types (Hurst and Dickson 1992, Hurst 1998). The net result of all these changes has likely been a decline in broad scale habitat diversity for turkeys, along with an increasing need for active management in the forests of today. Declines in Mississippi's turkey harvest over this timeframe (Figure 1) should be unsurprising, and were anticipated by early habitat

Table 2. *Total forested acres by forest-type in Mississippi based on U.S. Forest Service Forest Inventory and Analysis, 1977–2013.*

FOREST-TYPE GROUP	1977	1987	1994	2006	2013
Longleaf-slash pine	1,052,114	857,728	866,096	745,543	838,943
Loblolly-shortleaf pine	4,201,603	3,909,716	4,836,667	7,085,729	7,333,903
Other eastern softwoods	8,443	29,217	48,689	77,712	66,698
Oak-pine	3,451,179	3,469,561	3,218,274	2,204,641	2,020,588
Oak-hickory	4,354,814	5,519,048	5,834,293	5,347,213	5,095,131
Oak-gum-cypress	2,916,816	2,575,924	2,960,617	2,512,846	2,449,588
Elm-ash-cottonwood	681,655	617,336	749,851	1,192,498	1,176,402
Other hardwoods	0	0	0	13,649	13,769
Exotic hardwoods	0	0	0	45,675	64,127
Nonstocked	18,076	8,073	72,849	159,410	207,673
Total	16,684,700	16,986,604	18,587,331	19,384,827	19,266,824

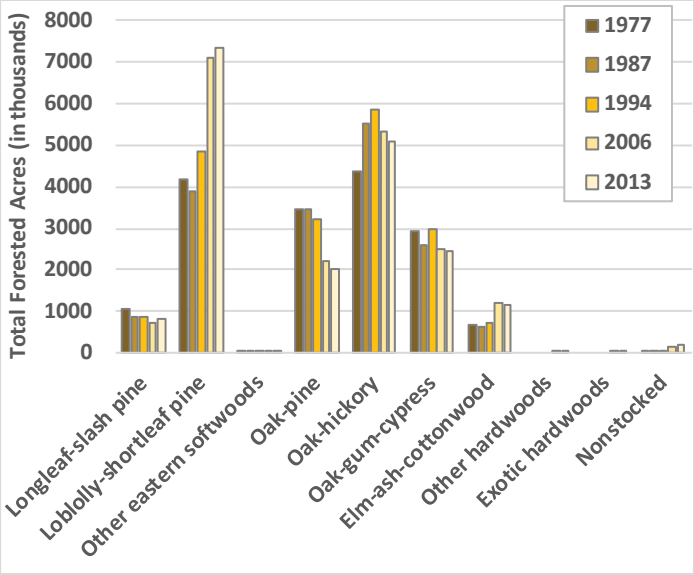


Figure 17. *Total forested acres (in thousands) by forest-type based on U.S. Forest Service Forest Inventory and Analysis in Mississippi, 1977–2013.*

suitability modeling incorporating timberland change scenarios similar to those reflected in the FIA data (Flather et al. 1985).

Recent research by the MDWFP and MSU mapped turkey habitat suitability throughout the state (Figure 19; Davis 2016). The MDWFP's East-central wild turkey management region had the highest average habitat suitability, whereas the Delta had the lowest (Table 3). These models were not able to consider within-stand characteristics, or evaluate how habitat suitability may have changed through time, yet they do provide a basis for understanding current statewide habitat distribution.

Future predictions suggest urbanization will cause forest area to decline throughout the Southeast in coming decades (Wear and Greis 2013). Mississippi appears to be less likely to undergo these changes as compared to its neighbors; nonetheless, continued forest increases are unlikely and losses are predicted near metropolitan areas. Moreover, the forests that remain will be increasingly composed of pine plantations (Wear and Greis 2013). The culmination of recent forest changes, along with those predicted, suggest quality turkey habitat may be less abundant today, and may become increasingly limited in the future. A more thorough understanding of the integration of habitat availability across varying scales (e.g., stand, local, regional, statewide), along with models of future availability, is needed to plan effective management strategies to assess the degree habitat deficiencies limit turkeys and to mitigate against potential future losses.

Predators and Wild Turkeys

Predation has a tremendous impact on turkey populations (Hughes et al. 2005). As compared to other game birds, predation on non-reproductively active adults is relatively low. However, like other ground nesting birds with precocial young, depredation rates can be high for nests and extreme on the young (Vangilder 1992). For this reason, studies suggest hen reproductive success is the most important factor for population growth (Warnke and Rolley 2007), and concerns over predation therefore usually focus on the role predators play in shaping the annual reproductive cycle (Hughes et al. 2005).

There is conflicting evidence concerning how predator abundance influences turkeys. On Tallahala WMA in Mississippi, Lovell et al. (1997) correlated declines in turkey reproduction with declines in recreational trapping and raccoon hunting. They believed lack of hunter and trapper interest was the mechanism driving declines in turkey nest success. In Alabama, Speake (1980) demonstrated an increase in poult to hen

Figure 18. *Total acres (in thousands) of longleaf, loblolly, oak-pine, oak-hickory, and oak-gum-cypress forests by region in Mississippi, 1977–2013. Based on U.S. Forest Service national Forest Inventory and Analysis data.*

Table 3. *Average habitat suitability values for 5 MDWFP Wild Turkey Management regions, based on habitat modeling accomplished by Davis (2016). Habitat suitability values can be interpreted as the average probability throughout each region that a wild turkey will occur within radius equal to the average wild turkey's home range (2.15 km).*

Wild Turkey Management Region	Average Habitat Suitability	Standard Deviation of Habitat Suitability
Delta	26%	0.165
Northeast	52%	0.180
Southeast	59%	0.158
Southwest	57%	0.168
East-Central	62%	0.130

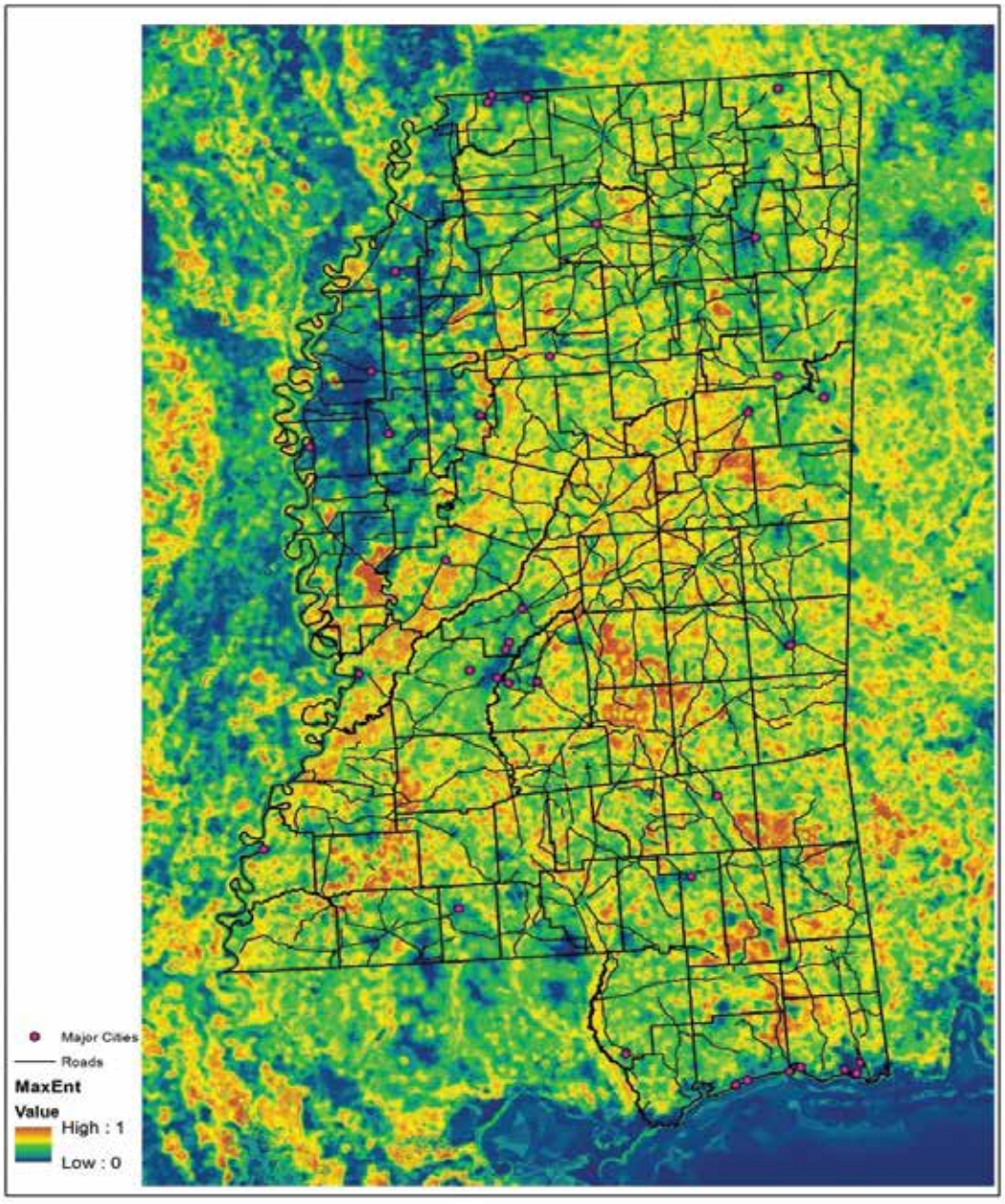


Figure 19. *Wild turkey habitat suitability prediction map for Mississippi. Suitability values range from highly suitable (deep red) to unsuitability (blue), and can be interpreted as the probability (0-1; 0=unsuitable, 1=highly suitable) that wild turkeys will occur within a radius equal to the average wild turkey's home range. Based on habitat modeling from Davis (2016).*

ratios and the proportion of hens accompanied by broods on an area where mammalian predators were intensively trapped. On the other hand, raccoon abundance is unrelated to turkey abundance at local, regional, or statewide scales in other areas (Schwertner et. al 2004). Furthermore, while turkeys do face extreme predation at certain points within their life cycle, it has been demonstrated that populations and hunter harvest can remain stable or grow even while predator populations are high and/or reproductive values are relatively low due to predation (Vangilder 1992, Miller et al. 2001).

Slumping fur prices and the ensuing long-term decline in trapping, along with loss of interest in recreational hunting of raccoons and other turkey predators, has led many landowners, hunters, biologists, and others to believe reductions in furbearer harvest have caused predators to increase such that their influence on turkey populations may be more significant today (Lovell et al. 1998, Hurst 1998, Leopold and Chamberlain 2002). The MDWFP collects harvest data on the furbearer and predator community as part of its annual trapper survey. Similar to the annual hunter harvest survey, the trapper survey questions trappers about their catch and effort. However, unlike the annual hunter harvest survey, the trapper survey is a complete census of all licensed trappers. This survey is one of the few objective sources of information on the status of predator populations in Mississippi.

Figure 20 illustrates trends in total harvest of six major mammalian predators of turkeys or turkey nests: raccoons, opossum, striped skunks, gray fox, bobcat and coyote. Since the 1976-77 trapping season, total statewide catch by licensed trappers has declined substantially for five of these six species. For instance, total raccoon catch peaked during the 1979-80 trapping season with 72,053 individuals caught statewide. By comparison, only 11,913 raccoons were caught in 2015. Of the six species illustrated, only total catch of coyote has increased over time.

Based on total catch figures from Figure 20, it is reasonable to assume that predator populations have been released from trapping mortality. However, similar to turkey harvest, total trapper catch may not be an accurate assessment of furbearer population trends because total catch is related to trapping effort. As with game harvests, measuring catch per unit effort (CPUE) is a more accurate way of assessing the status of furbearer populations. Figure 21 does this by demonstrating average catch per successful trapper. Based on CPUE, the nest predator guild (raccoons, opossums, and striped skunks) appear to have remained unchanged since the late 1970s (Figure 21). Catch by successful trappers of gray fox experienced a slight drop in the late 1970s, but has remained relatively flat since. Alternatively, CPUE of coyotes and bobcats, two species that prey on turkeys at nearly all life stages, has increased through time (Figure 21). The annual rate of increase has been approximately 3% and 5.5% for bobcat and coyote, respectively. The increase has been relatively steady through time for bobcats, whereas coyote catch exhibits a marked increase during the late 1980s and early 1990s, with only a slight uptick since. These trends could be due to an absolute increase in the populations of these two species, a tendency for trappers to more prominently focus on catching bobcats and coyotes over time, or a combination of both.

Predator populations will undoubtedly continue to be suspected by many stakeholders as a primary limiting factor to Mississippi's wild turkey population. While data suggests that this suspicion may not be unwarranted, it is important to note the complexities associated with the process of predation and the role it plays on game species. Absolute increases in predators may not always directly correspond to declines in prey populations (Newton 1998), and the process of predation cannot be evaluated apart from other confounding factors such as habitat quality or environmental variables (Seiss et al. 1990, Badyaev 1995, Roberts and Porter 1998, Fuller et al. 2013, Fleming and Porter 2015). Likewise, human practices, such as the recent rise in supplemental feeding, could intensify predation on turkeys, as it has been demonstrated that nesting success is lower when hens nest in proximity to feeders (Cooper and Ginnett 2000). Finally, it is important to separate predation as a decimating factor (i.e., it simply causes high losses) versus a true limiting factor (i.e., it actually prevents population growth; Leopold and Chamberlain 2002).

Given all these intricacies, it is difficult to fully gauge the degree to which predators are influencing turkey abundance in Mississippi. Without this knowledge, management prescriptions aimed at predators with the intent of increasing turkey numbers are haphazard and impossible to monitor. Detailed demographic studies, which look at turkey population growth (or loss) in current-day settings will be necessary to fully understand this issue. Demographic rates from prior Mississippi studies can be found in Appendix A. Undertaking up-to-date evaluations, along with adopting management to address predation, is a goal of this plan.

Diseases and Wild Turkeys

Wild turkeys are susceptible to many infectious diseases, parasites, and toxins. Normally these are not considered influential at the population level, however, periodic outbreaks of high prevalence can occur which may become locally devastating (Davidson and Wentworth 1992). As an example, strong observational evidence suggests turkey population crashes during the late 1980s and early 1990s throughout south and central Mississippi were disease related (Hurst 1998). Furthermore, the practice of feeding grains, especially corn, has the potential to cause physiological harm to turkey due to toxins caused by fungi in the Aspergillus genus (aflatoxins; Quist et al. 2000), and concentrating wildlife in unnaturally high densities via artificial feeding has the potential to increase disease prevalence (Sonant and Maestro 2006).

The MDWFP Wild Turkey Program responds to public reports of sick or otherwise ill wild turkeys. Historically, few diseased turkeys are reported each year. Recently, however, reports of sick turkeys in Mississippi have increased. Since 2012, there have been over 80 diseased turkeys reported to MDWFP from across the state. Most originated from southern Mississippi, with a less intense grouping in the east-central region, and scattered reports from northern counties (Figure 22). The volume of these cases, along with observations of rapid local population crashes, suggests that portions of Mississippi may have undergone disease-related population declines during 2012 to 2016.

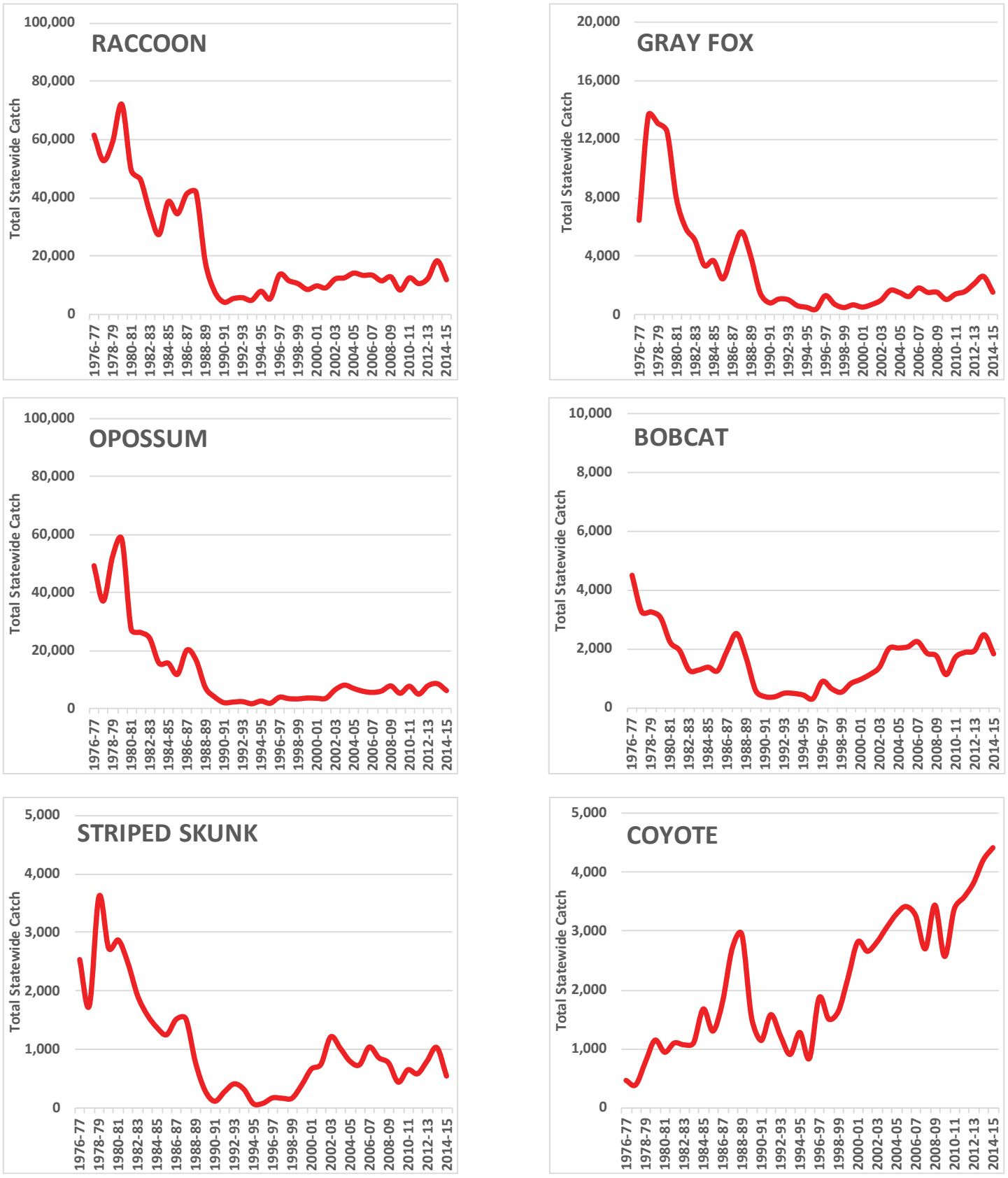


Figure 20. *Total harvest of six primary mammalian predators of the wild turkey by licensed trappers in Mississippi, 1976–2015.*

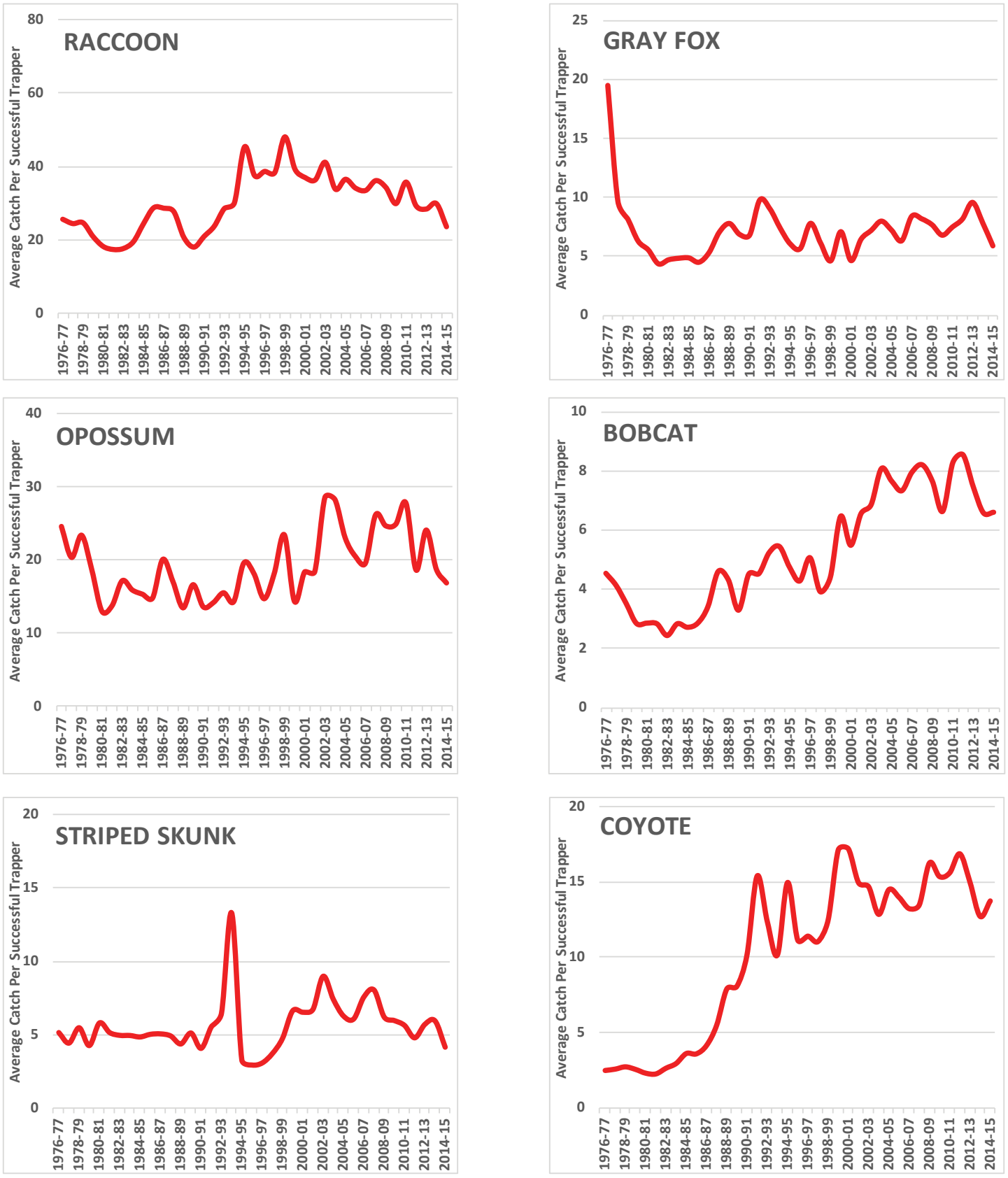


Figure 21. *Catch per successful trapper for six major mammalian predators of the wild turkey by licensed trappers in Mississippi, 1976–2015.*

When feasible, diseased specimens are collected by the MDWFP and sent to the Southeast Cooperative Wildlife Disease Study (SCWDS) in Athens, GA for necropsy. Since 2012, diagnostic results have been provided to MDWFP from SCWDS on 23 turkey cases (Table 4). The most common disease was Lymphoproliferative disease virus (LPDV; 61% of cases) followed by avian pox (43% of cases). Lymphoproliferative disease virus is poorly understood and was not considered an issue to wild turkeys in the southeast before 2009 (Allison et al. 2014). The significance of LPDV to turkey populations is currently unknown, but surveys indicate LPDV is more widespread than originally suspected, with only a small percentage of birds showing clinical symptoms (Thomas et al. 2015). In domestic turkeys, mortality rates following experimental infection have exceeded 20% (Biggs et al. 1978), but it is unclear if these rates are applicable in the wild. Avian pox, a common disease of wild turkeys, is likely always present at low levels within populations. Avian pox causes lesions on exposed skin surfaces, and can be fatal, although most infected birds will succumb to predation first due to their lethargic condition. The disease is primarily vectored by blood-feeding insects or by inhalation and/or ingestion of infected skin cells from birds feeding in close contact with one another. Generally, the disease is of little consequence to populations, although occasional intense outbreaks do occur (Davidson 2006).

The degree to which disease or other illness currently limits turkey populations in Mississippi is unknown and difficult to measure. Nevertheless, the prevalence of sick turkeys reported to MDWFP has increased in recent years. This increase may partially have resulted from introduction of an exotic disease (LPDV) into the Mississippi flock. Alternatively, disease prevalence may have intensified due to practices which unnaturally concentrate birds, such as supplemental feeding (Sonant and Maestro 2006), or which introduce parasites and/or pathogens into areas turkeys frequent, such as using chicken litter fertilizer exposed to Histomoniasis (Waters et al. 1994) or corn sold as "wildlife feed," which unlike corn for human and livestock consumption is not screened and rejected based on aflatoxin levels (Fischer et al. 1995, Schweitzer et al. 2001). Without proactive and effective surveillance, it is impossible to fully evaluate disease influences on Mississippi's turkeys. Developing a program to monitor and mitigate disease is an important component of this comprehensive management plan.

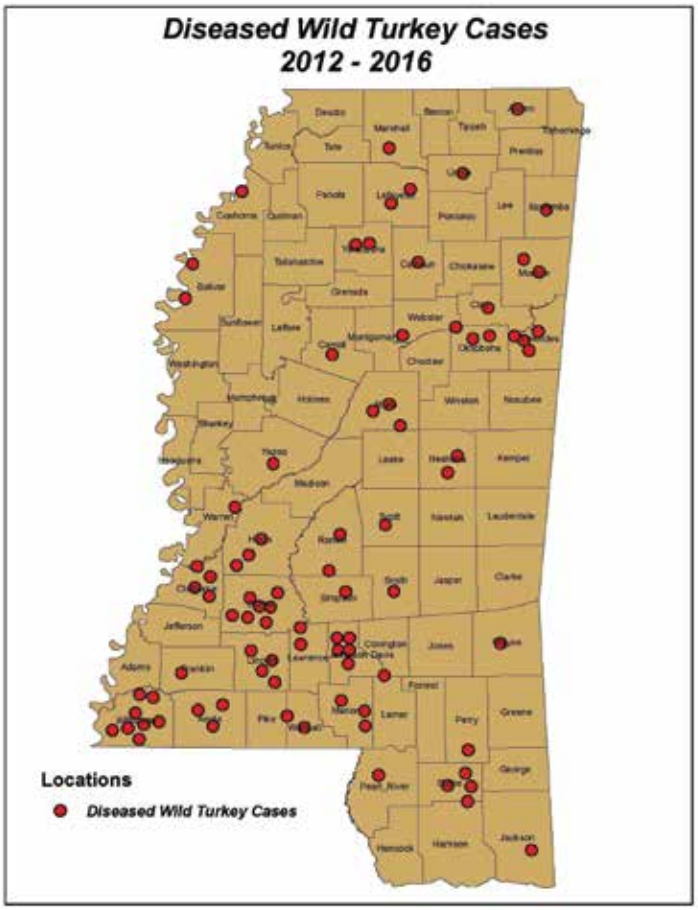


Figure 22. *Approximate locations of diseased wild turkeys reported to MDWFP from fall 2012 to fall 2016.*

Harvest of Wild Turkeys

Mississippi currently allows a spring, gobblers-only hunting season across most of the state, and a fall, either-sex hunting season by permit-only in limited portions of the state. Spring gobbler hunting is by far the most popular, with over 35,000 licensed hunters annually participating (see Figure 2). By comparison, less than 100 properties legally hunted in the 2015 fall season. Modeling simulations have been used to investigate harvest's effects on turkey populations. Most work has been focused on fall, either-sex seasons due to hen harvest's potential to influence population trajectories. Relatively few studies have assessed the impact spring harvest has on turkey abundance because gobblers-only spring seasons are considered sustainable with minimal effect on population growth rates. This perspective is generally considered valid as long as: (1) spring harvest is limited to males, and (2) spring gobbler hunting does not disrupt breeding behavior (Healy and Powell 1999).

Since adult gobblers are the only legal birds for harvest by hunters 16 years of age or older in Mississippi, it is reasonably safe to assume that the first above assumption is met. However, studies in other southeastern states have demonstrated that illegal or accidental hen kill occurs in spring seasons and can be a particular issue for frameworks that open before most hens begin nest incubation (Davis et al. 1995, Norman et al. 2001). While hen kill has rarely been shown to be excessive, even low levels could limit populations (Healy and Powell 1999). On Tallahala WMA in Mississippi, Miller et al. (1998a) found that illegal hen kill never exceeded 5% of the female population and believed it to be an insignificant mortality factor. Similarly, Palmer et al. (1993a) found illegal kill was only responsible for 3% of hen deaths in Kemper County. In a recent MDWFP survey of 370 SGHS participants, 21% reported having firsthand knowledge of a game violation involving turkeys within the previous year, but only a single individual reported a violation which involved killing a hen (MDWFP unpublished data). Given these findings, it seems unlikely that illegal or accidental hen kill limits populations in Mississippi.

The assumption that spring gobbler hunting does not disrupt breeding behavior refers to the potential for excessive early-season gobbler harvest, occurring before peak breeding, to cause too few gobblers to be available to complete breeding

Table 4. *Diagnostic findings of diseased wild turkeys submitted to the Southeast Cooperative Wildlife Disease Study by MDWFP, 2012–2016.*

Case #	Sex	Date	County	Final Diagnosis
CC12-592	Male	Oct-12	Monroe	Lymphoproliferative disease virus
CC12-654	Male	Dec-12	Copiah	Lymphoproliferative disease virus and avian pox
CC12-655	Female	Oct-12	Perry	Lymphoproliferative disease virus
CC12-656	Female	Dec-12	Itawamba	Avian pox
CC12-667	Female	Dec-12	Stone	Lymphoproliferative disease virus, avian pox, pneumonia
CC12-674	Female	Dec-12	Lafayette	Lymphoproliferative disease virus, avian pox, bacterial sepsis
C13-18	Male	Jan-13	Webster	Lymphoproliferative disease virus, chronic Staphylococcus bacterial dermatitis
CC13-23	Female	Nov-12	Wilkinson	Lymphoproliferative disease virus, avian pox
CC13-88	Male	Mar-13	Jeff Davis	Histomoniasis (Blackhead disease)
CC13-105	Male	Apr-13	Hinds	Trauma
CC13-166	Female	May-13	Lincoln	Lymphoproliferative disease virus, Chronic bacterial dermatitis (multiple genus)
CC13-323	Female	Sep-13	Jeff Davis	Lymphoproliferative disease virus, avian pox, Histomoniasis (Blackhead disease)
CC13-439	Female	Oct-13	Lafayette	Lymphoproliferative disease virus, avian pox
CC13-466	Male	Nov-13	Jeff Davis	Pneumonia associated with acute exposure to Aspergillus fungi
CC14-30	Male	Jan-14	Monroe	Bacterial pneumonia
CC14-134	Male	Apr-14	Jeff Davis	Emaciation, chronically infected skin wounds, protozoal cysts, ultimate cause undetermined
CC14-150	Female	May-14	Lafayette	Lymphoproliferative disease virus, chronic dermatitis
CC14-361	Male	Nov-14	Marshall	Avian pox with secondary bacterial infection
CC15-438	Female	Aug-15	Lowdnes	Lymphoproliferative disease virus, enteritis, avian pox, Tetratrichimonas gallinarum, Listeria monocytogenes
CC15-631	Female	Nov-15	Oktibbeha	Protozoal pneumonia, Toxoplasma gondii
CC15-662	Male	Dec-15	Warren	Lymphoproliferative disease virus, avian pox
CC16-99	Female	Feb-16	Smith	Lymphoproliferative disease virus, undetermined cause of death
CC16-127	Females	Mar-16	Tallahatchie	Organophospate insecticide intoxication

activities. The likelihood this occur across large areas is probably low; however, studies do exist suggesting lack of adult gobblers can be an issue for population productivity within localized areas (Exum et al. 1987, Isabelle et al. 2016). Given the timing of Mississippi's opening day (March 15), violations of this assumption deserve consideration. Nesting chronology is highly variable, but on average Mississippi's regular spring season opens three to four weeks before nest initiation (Whitaker et al. 2005). Meanwhile, the majority of gobbler harvest occurs within the first two to three weeks of the season (Miller et al. 1997, MDWFP unpublished data). Disruption of breeding behavior would seem more likely under these conditions, yet, the degree to which this actually occurs and limits turkey reproduction is unknown. Delaying spring harvest until at least the average nest initiation date has been advocated as a conservative approach to spring gobbler seasons (Kurzejeski and Vangilder 1992) and has recently been recommended by the Southeast Association of Fish and Wildlife Agencies Wild Turkey Working Group (Southeast Association of Fish and Wildlife Agencies – Wildlife Resources Committee 2016).

Spring gobbler harvest has been shown to be an additive source of mortality (Moore et al. 2008), with most gobbler deaths occurring during the spring (Godwin et al. 1991). As a result, spring harvest rates can influence gobbler availability from year to year. The adoption of the "no-jake" law in 1998 was a conservative measure by MDWFP to increase adult gobbler availability (Leopold and Cummins 2015). However, Mississippi's current spring season is the longest in the Southeast, and allows nearly three more weeks of turkey hunting opportunity than the southeastern average (Figure 23). Studies have shown that season length can have a tremendous effect on gobbler harvest and survival rates. In Louisiana, Chamberlain et al. (2012) used banding data to evaluate liberal and conservative frameworks and reported that a 21 day season reduction resulted in a two-fold increase in gobbler survival. In a separate study on private lands in Louisiana, harvest rates of gobblers increased from 20% to 45% following a seven day increase in season length (Byrne et al. 2014b). A similar increase in gobbler harvest rates were reported for a one week extension to the spring season in Missouri (Hubbard and Vangilder 2005). More recently, Butler et al. (2015) demonstrated that a 2005 regulatory change that lengthened Mississippi's season caused at least a 15% decline in harvest per hours hunted by SGHS participants.

Harvest studies suggest spring gobbler kill should not exceed 30% of the male population (Vangilder and Kurzejeski 1995, Healy and Powell 1999, Byrne et al. 2014b) or else declines in available adult gobblers may negatively affect hunting quality. Studies on public lands in central Mississippi and the Delta found values near to slightly above this range (Palmer et al. 1990, Lint et al. 1993, Chamberlain 1995), but these works were conducted under more conservative frameworks

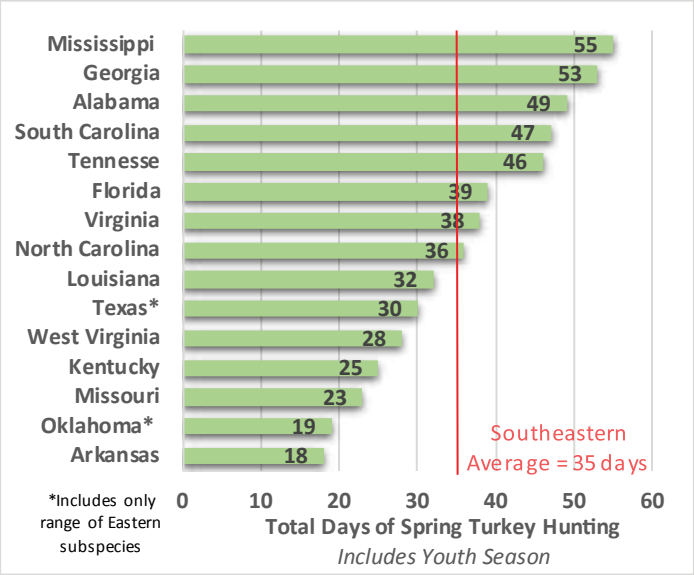


Figure 23. *Total days of spring turkey hunting opportunity for 15 states comprising the Southeastern Association of Fish and Wildlife Agencies, 2015.*

than today. Holder (2006) reported a harvest rate of 64% for a limited sample of adult gobblers on Malmaison WMA with a framework that was nearly a week less than the present season. Until survival and harvest studies are conducted under Mississippi's current spring framework, it is difficult to gauge the influence harvest intensity has on limiting the annual availability of gobblers.

Natural Resource Professional Focus Groups

During the fall of 2015, the MDWFP Wild Turkey Program reached out to biologists, researchers, Conservation Officers, and other natural resource professionals from within MDWFP and various partner organizations throughout the state to discuss topics associated with wild turkey management in Mississippi. In addition working within the natural resource conservation arena, most of these individuals were also active turkey hunters. These focus groups were tasked with identifying the primary challenges facing wild turkeys, along with potential solutions and opportunities to improve statewide management. The following sections overview discussions and concerns that emerged from each focus group.

Wild Turkey Conservation on Private Lands

On October 19th, 2015, a meeting of natural resource professionals was held at the MDWFP Turcotte facility to discuss statewide wild turkeys issues, particularly those on private lands. Representatives attended from the MDWFP, Mississippi Forestry Commission, US Fish and Wildlife Service, USDA Natural Resource Conservation Service, National Wild Turkey Federation, Anderson-Tully Timber Company, and Mississippi State University Extension Service. Collectively these professionals represented a wide breadth of natural resource management experience in Mississippi.

Several common themes emerged from the group's discussion. The first largely involved habitat availability and management. Members of this focal group believed turkey habitat on many private lands suffered, and the group directly correlated localized turkey abundance to both stand- and landscape-level management practices. Changing land use over recent decades was characterized unfavorably for turkeys in many areas of Mississippi. Specific examples cited included conversion of grazed pasturelands, which serve as brood-rearing grounds, to other land covers that offer scant brood habitat. Participants believed that the net result of land use changes over the last three decades have caused many areas of Mississippi to now be either too fragmented for turkey suitability or not fragmented enough to adequately intersperse all the bird's needs. In either case, it was hypothesized that aggregate economic-driven policy and land use decisions have changed the nature of turkey habitat availability. The status of wild turkeys was acknowledged as being a byproduct of the state's natural resource-based economy, and this economy may have become less diverse, thereby providing fewer resources for turkeys.

At the local scale, insufficient or incompatible forest management was proposed as a limiting factor. Lack of "aggressive" pine forest management was seen as resulting in mid-rotation harvests or other actions which are too infrequent for ideal turkey conditions. This was seen as being due to managing in reaction to market fluctuations rather than by forest management prescriptions. Similarly, it was suggested economies of scale within the logging industry do not always fit wildlife habitat management; the industry has trended toward larger, higher-volume operations at the same time land ownership patterns have trended toward smaller holdings. This may produce situations where allowances for wildlife values are too cumbersome to accommodate. There was consensus among the group that beneficial management practices such as prescribed burning are too infrequent. Invasive species, both plants and animal (specifically wild hogs), were acknowledged as threats that are overlooked.

A second major theme focused on the current spring season framework. A majority of the group believed Mississippi's season structure needed evaluation. Most within the group favored a shorter season with a later opening date. Improved hunting quality and a more biologically conservative harvest approach were cited as reasoning. Concerns that a later opener would miss prime gobbling activity in the southern portions of the state led to some disagreement about how late to delay opening day. Implementation of zones was suggested as a compromise that would allow for a staggered opening date and more closely align a shorter season with gobbling peaks. Changes to the youth week were also suggested, primarily because youth season currently falls during a time when hunting can be poor due to weather conditions and turkey behavior.

PRIVATE LAND PROFESSIONAL RECOMMENDATIONS

Following open discussion on the challenges facing wild turkeys, the Private Lands Professional focus group was asked to identify opportunities to address statewide turkey management. The suggestions included:

- ***Educate landowners and hunters.*** Landowners and sportsmen should be convinced that proper management is critical to turkey abundance, and need to be able to find guidance in implementing sound management prescriptions. An association needs to be established between land management decisions and turkey population trends; too few recognize the relationship between subtle land use changes and turkey numbers. Professionals should promote management of open areas, sound forestry, retention of hardwoods, and use of prescribed fire.

- ***Develop demonstration areas.*** Public lands such as Wildlife Management Areas and state parks provide great opportunities to display management benefiting turkeys and other wildlife. When these areas are not managed well, educational opportunities are missed.

- ***Recruit advocates for wild turkey conservation.*** Mississippi is home to many well-known turkey hunters, turkey call makers, and other "celebrities" within the hunting industry. It was suggested that relationships should be built with these individuals so that they can become high-profile ambassadors for turkey conservation messages.

- ***Influence land use policy and decision making.*** While outreach to individual hunters and landowners is important, involvement in land-use policy can have the farther reaching results. Inclusion of wild turkey recommendations to groups such as the NRCS State Technical Committee and marketing of USDA/NRCS and other cost-share programs as "Wild Turkey Initiative" practices could encourage habitat management.

- ***Build partnerships.*** Many other wildlife species benefit from good turkey habitat. Groups and funding aimed at species which share similar needs as wild turkeys should be utilized. Likewise, cost-share programs in other states are successful by building delivery partnerships. Nontraditional partnerships should be formed with stakeholders influencing land use but who may be unaware of wild turkey issues.

- ***Monitor results of management.*** Too often, good habitat management for wild turkeys and other wildlife goes unnoticed because the response is not measured or reported. For long-term effectiveness, data should be collected on habitat initiatives so that success can be demonstrated.

- ***Utilize new technologies to increase public excitement.*** Recently, many new technologies have been developed which could increase sportsmen's awareness of the issues facing wild turkeys. These technologies may allow for increased dissemination of information and foster greater involvement in turkey conservation by the public.

MDWFP Wildlife Management Area Staff

On October 28th, 2015, a meeting was held with a majority of the MDWFP Wildlife Bureau's WMA biologists and supervisors along with representation from the National Wild Turkey Federation at MDWFP's Turcotte facility. The meeting's purpose was to identify issues to improve turkey management and turkey hunting throughout the MDWFP WMA system.

In the opinion of the WMA staff, the greatest challenge facing wild turkey management on MDWFP WMAs was insufficient staffing to accomplish necessary management. Over the last decade, WMA program staffing has declined by 50% while the number of WMAs within MDWFP's WMA system has increased by 33%. It was the opinion of the staff that the Wildlife Bureau would continue to be ineffective in managing WMAs at a high level until this deficiency was addressed. The staff also noted turkey habitat on WMAs suffers due to lack of dedicated forestry staff within the WMA Program.

Several specific WMA habitat issues were discussed. Selective timber harvests, prescribed fire, and other forest management were recognized as keys to wild turkey abundance on most areas. There was also significant discussion on the management of WMA food plots and wildlife openings. It was acknowledged that the MDWFP WMA Program historically did a better job with wildlife opening and food plot management, but current staffing and budgets prevent managing at desired levels even though acres devoted to permanent wildlife openings were seen as an important component of good turkey habitat.

There was significant discussion of spring season dates on WMAs. Most agreed that frameworks on WMAs should not necessarily mirror the statewide season if quality hunting experiences are desired. The staff's opinion was that WMA turkey seasons should be more conservative than the regular statewide framework. Special WMAs, with frameworks that are draw-only throughout the duration of the season, could remain unchanged.

Increasing the value of data collected on WMAs was also identified as a priority. Ideas to improve data quality included increased law enforcement presence during times of high hunter traffic to aid daily user card compliance. Other thoughts were to place more emphasis on interactions between WMA managers and hunters. Development of standardized WMA fact-sheets could serve to educate hunters on the value of data collected via daily visitor cards.

The concept of "focal WMAs" for wild turkeys was discussed with mixed support. While some saw this as a potentially beneficial way to highlight turkey management, others felt that it could result in unequal distribution of resources within the WMA system.

There was also discussion of wild turkey management on non-MDWFP WMA public lands. It was acknowledged that relationships could, and should, be strengthened with other public land agencies (US Forest Service, US Fish and Wildlife Service, US Army Corps of Engineers) to work together on improving conditions for turkeys. Strengthening working relationships with other agencies and entities that own land within the MDWFP WMA system should receive special priority.

MDWFP WMA STAFF RECOMMENDATIONS

Following open discussion on the challenges facing wild turkeys, the MDWFP WMA staff focus group asked to identify opportunities to address statewide turkey management. The suggestions included:

- ***Expand MDWFP WMA staffing.*** Specifically, filling vacancies lost since 2005 should be prioritized. Additionally, development of a WMA forestry staff composed of registered foresters is badly needed. It was also suggested that a position should be developed within the WMA program with responsibilities dedicated to working with other public land agencies to promote habitat management on non-state-owned WMAs.

- ***Adopt more conservative frameworks for spring turkey season on WMAs.*** Many suggested WMAs should go to an April 1 - 30 season structure. Under this proposal, the week preceding April 1 could be youth week. The first week of April could be draw-only or not, depending upon the needs of the individual WMA. Areas with draws throughout the entirety of the season (e.g., Sardis Waterfowl, Charles Ray Nix, Black Prairie, Ward Bayou, Twin Oaks, Canemount, etc.) could remain under existing frameworks.

- ***Utilize outside contracting for WMA habitat management.*** Until staffing needs are filled, outside contractors should be utilized more frequently as a stop-gap to accomplish habitat management practices.

- ***Develop a system to acquire and better utilize WMA user data.***

MDWFP Conservation Officers

On September 29th, 2015, a meeting was held at the MDWFP Jackson office between the MDWFP Wildlife and Law Enforcement Bureaus to discuss issues pertaining to the development of a MDWFP Comprehensive Wild Turkey Management Plan. The Chief of the Law Enforcement Bureau was asked to select Conservation Officers from throughout the state to serve as representatives. The meeting's objectives were to identify law enforcement, regulatory, and other concerns effecting turkey management in Mississippi.

The primary issue raised was the need for a tagging and harvest reporting system. There was a consensus that Mississippi's bag limit is essentially unenforceable. The Conservation Officers in attendance suggested that implementing tagging and harvest reporting was their top priority in terms of turkey hunting law enforcement. Furthermore, after informally surveying their peers, they felt this was a sentiment shared by the majority of field officers in the Law Enforcement Bureau. It was suggested that tagging would give Law Enforcement more motivation to focus on turkey cases. One officer commented, "Give officers a chance to enforce the law and you'll get more participation in law enforcement." In other words, the opportunity to use tags as a tool to enforce existing laws (the bag limit) would motivate officers to put more emphasis on working turkey hunting cases versus other springtime law enforcement activities (e.g., fishing, boating, etc.). This would synergistically lead to opportunities for citations on other turkey hunting violations in addition to aiding bag limit enforcement.

Much discussion ensued regarding the details of a tagging and harvest reporting system. The officers suggested that Missouri's model of tagging and harvest reporting seemed best. Birds should be tagged immediately after harvest, before moving, with a physical tag on the leg. Furthermore, there should be minimal time allowed between harvests and reporting, or else the regulation's effectiveness for bag limit enforcement would be reduced. Missouri requires harvest reporting by 10 P.M. on the day of kill, which everyone agreed was ideal. To be effective, it was recommended that tagging offenses be at least a Class 2 violation with hunting privileges revoked following a second offense. Once administered, the bag limit would become more meaningful, and some officers suggested that changes (primarily reductions) to the bag limit should then be explored, particularly for nonresidents.

The second issue raised during the open session was the need to address the current spring season structure. All in attendance agreed that Mississippi's season framework is not ideal. Specifically, those in attendance felt that the spring season should be shortened and the opening date moved later. There was a consensus that a later framework would allow for higher quality hunting due to timing the opening day closer to peak gobbling. It was also suggested that a later opener would allow more breeding activity to take place before turkeys are harvested. The shortening of the season's length was further suggested as a means of promoting gobbler carryover. Most Conservation Officers in attendance regularly took spring turkey hunting trips to states with shorter frameworks, and believed that hunting quality was better in those states because of greater gobbler carryover. There was some discussion on creating turkey zones (i.e., zones of differing season frameworks) due to differences in the timing of gobbling, and because a later opener would not be as satisfactory with hunters in south Mississippi.

Officers were in agreement that there has been a substantial increase in turkey baiting since the instatement of the supplemental feeding regulation several years ago which made allowances for milo/wheat to be evenly spread during the spring as a quail management practice. Further discussion ensued on the negative aspects of allowing corn to be fed during the spring turkey season. It was also agreed recent liberalizations of the supplemental feeding regulation would continue to encourage an increase in turkey baiting.

Survey of MDWFP Law Enforcement Bureau

The MDWFP Wild Turkey Program conducted a survey of the MDWFP Law Enforcement Bureau at their annual in-service training in October and November 2015. A short series of written questions were provided to every officer in attendance to gauge their overall opinion on the law enforcement issues discussed in the focal group meeting.

Responses were received from 172 MDWFP Conservation Officers. Most officers (60%) felt turkey numbers had declined in their county over the last five years (Table 5). Only 7% felt turkey numbers had increased (Table 5), and most of these were concentrated in northern Mississippi (Figure 24). Nearly three quarters (73%) of officers felt violations of the gobbler bag limit were somewhat to very impactful in the area they worked (Table 5). Unsurprisingly, 95% of officers were therefore supportive of enacting a tagging and mandatory harvest reporting system for turkey in Mississippi (Table 5). There was slightly more support for a reduction to a one or two gobbler bag limit (one and two combined = 47%) than for the existing three bird bag (45%; Table 5). A nearly equal proportion of officers felt the current season was too long (47%) versus felt it was the appropriate length (46%), and there were more officers who felt the season began too early (44%) than at about the appropriate time (34%; Table 5).

All officers in attendance were provided space to write-in comments or concerns they had related to enforcement of turkey hunting regulations or the wild turkey resource. These statements are listed in Appendix B.

MDWFP CONSERVATION OFFICER RECOMMENDATIONS

Following open discussion on the challenges facing wild turkeys, the MDWFP Conservation Officer focus group was asked to identify opportunities to address statewide turkey management. The suggestions included:

- ***Implement a tagging and harvest reporting system.*** Without such a system the bag limit is unenforceable, and the MDWFP has very little data on harvests at the county level. Implementation of a tagging and harvest reporting system was the top priority of representative Conservation Officers and would emphasize the bag limit's importance to the public.
- ***Decreasing harvest pressure by reducing season framework.*** Given recent perceived population declines, it was believed that a more conservative approach to harvest framework would be beneficial. It was the recommendation of the group that the spring turkey season be reduced to 30 days and begin during either the last week of March or first of April.
- ***Disallow the use of any grain for supplemental feeding during the spring turkey season.*** For those who wish to spread grain as part of a legitimate bobwhite quail management, a permitting system should be developed.
- ***Increase access to equipment that Law Enforcement Officers can utilize on turkey violation cases.*** Examples were given such as Plot Watcher cameras that were recently purchased by the Mississippi Chapter of the National Wild Turkey Federation.
- ***Survey the entire MDWFP Law Enforcement Bureau regarding their opinions on specific wild turkey issues.***

Table 5. *Opinions of 172 MDWFP Conservation Officers regarding issues relating to wild turkeys, spring turkey hunting, and Mississippi turkey hunting regulations, 2015.*

During the last 5 years (2010-15) how would you describe wild turkey numbers in the county that you work?	
60%	responded that POPULATIONS HAD DECLINED.
28%	responded that POPULATIONS HAD REMAINED STABLE.
7%	responded that POPULATIONS HAD INCREASED.
4%	responded that they HAD NO OPINION.
In the area that you work, how impactful are violations of the wild turkey bag limit?	
27%	responded that the impact of violations was VERY SIGNIFICANT.
46%	responded that violations were SOMEWHAT IMPACTFUL.
15%	responded that violations were NOT AT ALL IMPACTFUL.
12%	responded that they HAD NO OPINION.
How would you feel about a regulation requiring tagging and mandatory harvest reporting of turkeys in Mississippi?	
85%	STRONGLY SUPPORT.
10%	SOMEWHAT SUPPORT.
1%	SOMEWHAT OPPOSE.
1%	STRONGLY OPPOSE.
3%	HAVE NO OPINION.
What do you think the seasonal bag limit for spring gobblers should be in your county?	
7%	suggested a seasonal bag of 1 GOBBLER.
40%	suggested a seasonal bag of 2 GOBBLERS.
45%	suggested a seasonal bag of 3 GOBBLERS.
2%	suggested a seasonal bag of 4 GOBBLERS.
6%	responded that they had NO OPINION.
Please indicate your belief regarding the length of the spring turkey season:	
47%	felt the season length was TOO LONG.
46%	felt the season length was JUST ABOUT RIGHT.
1%	felt the season length was TOO SHORT.
6%	had NO OPINION.
Please indicate your belief regarding the timing of the spring turkey season:	
44%	responded that the season started TOO EARLY.
34%	responded that the season started ABOUT RIGHT.
3%	responded that the season started TOO LATE.
19%	responded that they had NO OPINION.

Trappers and Predator Management

On November 9th, 2015, a meeting was held at the MDWFP Jackson office with biologists from the MDWFP, representatives of the Mississippi Trappers Association, and MDWFP Commissioner Billy Deviney. The purpose of the meeting was to better understand the status of furbearer and nuisance animal populations and the challenges facing the trapping community.

The meeting began with discussions of the current status of major turkey predators. A trapper in attendance shared that it was his belief that coyote and to a lesser degree bobcats had increased over the last decade, whereas many of the nest predator group (e.g., raccoons, opossums, skunks) had fluctuated annually, but were more or less stable. Commissioner Deviney suggested education of hunters and landowners on predator-turkey relationships was important, and predator management should be advocated alongside habitat management where appropriate.

One trapper and member of the Mississippi Trapper's Association (MTA), suggested that the MTA wanted to "professionalize" trapping, particularly of coyotes. Encouragement of "coyote cooperatives" where adjoining landowners jointly hire a trapper was suggested to make predator management more economical and logistically feasible. Outreach to increase trapping knowledge and skill among hunters and landowners was identified as an important issue that MDWFP could partner in promoting. Trapping related field days, such as the "Trapper's College," were suggested as events that could highlight trapping and disseminate information. Commissioner Deviney further suggested the MDWFP should make February "predator month" and encourage recreational trapping in media outlets during that time.

Other issues that were discussed to aid in increasing the ability for trappers to assist in predator management included expansion of trapping season in certain instances. However, it was noted that though this may allow for additional trapping, there would be little monetary value in furs beyond the current trapping window. On WMAs, trapping could be encouraged by allowing increased vehicle access for trappers, particularly at times outside prime hunting seasons.

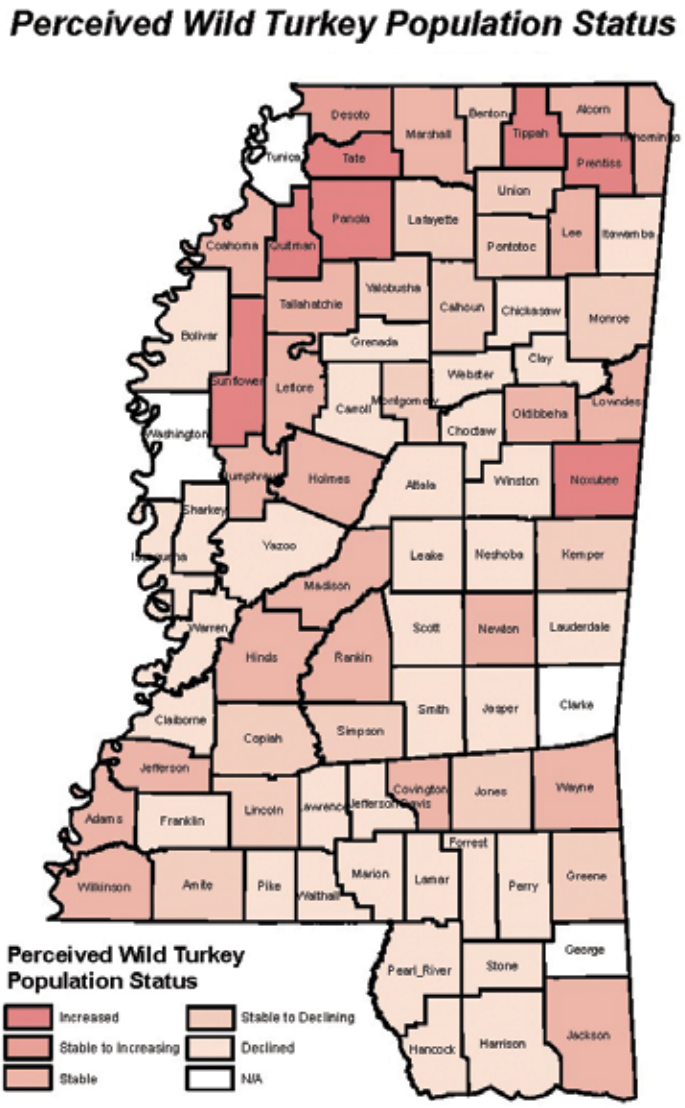


Figure 24. *Perceived prior 5-year trend in county-level wild turkey populations based on the opinions of 172 MDWFP Conservation Officers surveyed in November 2015.*

PREDATION MANAGEMENT RECOMMENDATIONS

Following open discussion on the challenges facing wild turkeys, the Trapper and Predator Management focus group was asked to identify opportunities to address statewide turkey management. The suggestions included:

- ***Educate hunters on the impact of predation and the fundamentals of recreational trapping.*** Predator management should be given attention alongside other aspects of turkey management in MDWFP publications and media. Partnering with the MTA on events such as the Trapper's College can help recruit new participants into the sport.

- ***Help facilitate relationships between interested landowners and professional trappers.*** MDWFP should develop a list of professional trappers that can be provided to landowners on site visits or through other technical guidance outlets just as is done for contractors of other management services.

- ***Develop a system to allow legal predator management outside the regular trapping season. Guidelines should govern conditions for permit issuance.*** The process can be structured similar to the nuisance permitting system for deer in agricultural settings.

- ***Incorporate predator studies into future wild turkey research.*** Determine the degree to which modern predator populations limit wild turkey populations and strategies to mitigate losses to predators.

Wildlife Research Scientists

On November 5th, 2015, wildlife biologists from MDWFP met with researchers from the College of Forest Resources at Mississippi State University and Weyerhaeuser Timber Company to discuss research needs in wild turkey ecology and management. It was generally acknowledged that some of the most important historical research on wild turkeys had been accomplished in Mississippi, but that there are shortcomings in the understanding of the species. Foremost of these is an inability to accurately estimate wild turkey numbers over large regions.

The unknown role novel diseases and disease prevalence may have on wild turkey populations was identified as a research deficiency. Certain parasites were acknowledged as potentially prevalent but overlooked. It was further acknowledged wildlife feeding has increased dramatically over the last decade, yet very little information is available directly linking turkey population trends to disease spread or toxins resulting from feeding.

Harvest trends (such as those shown in Figure 1) in conjunction with brood data suggest population mediation associated with density (density dependence), and this theory was discussed. However, little research has tested the driving mechanism behind density-dependent population limitation. Some discussion was given to recent southeastern studies suggestive of density dependent population mediation, including evidence that survival rates of adult turkeys has increased over recent decades.

A more thorough examination of some habitat management practices, such as the use of selective herbicides, was also suggested as a topic for future studies. Likewise, measuring demographic responses to habitat conditions and/or management (such as, does brood survival really increase with increases in brood habitat?), should be given prioritization.

WILDLIFE SCIENTISTS RECOMMENDATIONS

Following open discussion on the challenges facing wild turkeys, the Wildlife Research Scientist focus group was asked to identify opportunities to address statewide turkey management. The suggestions included:

- ***Continue to undertake projects that seek to understand population level wild turkey processes.*** These might include the interrelationship between habitat availability, land use change, management efforts, weather, demographics, and population rate of change.
- ***Study hunter efficiency.*** Much of MDWFP's data on wild turkeys comes from turkey hunters. For this data to be useful, assumptions are made that hunter efficiency remains constant, yet this has not been tested.
- ***Undertake studies to better evaluate the actual turkey population.*** Novel approaches may include use of camera surveys, data modeling, or direct harvest estimates.
- ***More thoroughly examine existing datasets.*** Mississippi has a wealth of data on turkeys, and much of this can be reexamined using more modern analyses or by asking broader questions. Similarly, a retrospective assessment of the wild turkey population in Mississippi, using all available data, may shed light on drivers of population trends.
- ***Devise studies to better assess the impact of disease and the role that feeding may play in disease prevalence.***
- ***Include measures of predator abundance or other surrogates to measure predation into future wild turkey studies.***

SECTION IV
ELEMENTS, OBJECTIVES, AND STRATEGIES

The following section outlines a framework through which the MDWFP and its partners can impact wild turkey management in Mississippi. The mission statement of the MDWFP is:

"To conserve and enhance Mississippi's wildlife, fisheries, and parks, provide quality outdoor recreation, and engage the public in natural resource conservation."

This charge provides a lens through which strategic planning for wild turkey management can be viewed. Seven primary elements, outlined below, have been identified to categorize statewide wild turkey conservation by the MDWFP. Each ties to the agency's mission statement by addressing aspects of conservation, enhancement, harvest, or user engagement. These broad categories are further honed into specific ways MDWFP can progressively work to enhance Mississippi's wild turkey flock. Each element is defined with an objective statement addressing its categorical importance to wild turkey management. The element is further broken into lists of strategies expressing a general course through which the element's objective can be achieved. Some strategies are further supported with detailed actions to fuel the element's desired outcome.

ELEMENT 1. ADMINISTRATION OF WILD TURKEY CONSERVATION

Objective: The MDWFP should provide the priority, capacity, and support necessary to effectively manage Mississippi's wild turkey resource.

Strategy 1.1: Adequately devote MDWFP personnel to wild turkey issues.
- **Action 1.1.1:** Continue support for two full-time Wild Turkey Program positions within the MDWFP Wildlife Bureau.
- **Action 1.1.2:** Seek outside opportunities for cooperative positions or personnel which can support activities aimed at wild turkeys or their habitat.
- **Action 1.1.3:** Form a working group within MDWFP composed of Wildlife and Law Enforcement Bureau representatives to address turkey related issues and needs.
- **Action 1.1.4:** Form an advisory committee from outside MDWFP with representation by sportsmen, conservation groups, and natural resource professionals to continuously identify wild turkey conservation priorities.
- **Action 1.1.5:** Annually (ideally between deer and turkey seasons), host regional meetings to provide wild turkey management updates to Wildlife and Law Enforcement Bureau personnel.

Strategy 1.2: Identify, generate, and support funding to benefit wild turkeys.
- **Action 1.2.1:** Document shortcomings in funding for wild turkey management.
- **Action 1.2.2:** Explore adoption of a Wild Turkey Stamp whose proceeds are earmarked for wild turkey management.
- **Action 1.2.3:** Actively encourage MDWFP personnel to effectively utilize funding support from the Mississippi Chapter of the National Wild Turkey Federation (MS-NWTF).
- **Action 1.2.4:** Work with conservation-minded organizations to raise wild turkey-specific funding.
- **Action 1.2.5:** Seek novel utilization of Pittman-Robertson funding for wild turkey projects, such as incorporation of MS-NWTF Super Fund dollars as matching funds.
- **Action 1.2.6:** Utilize new technologically based approaches to fund raising, such as crowdsourcing, for raising dollars aimed at specific projects.

Strategy 1.3: Effectively communicate wild turkey issues to policy makers.
- **Action 1.3.1:** Annually conduct a wild turkey-focused update and education session with the Commission on Wildlife, Fisheries, and Parks.
- **Action 1.3.2:** Develop periodic hunter opinion surveys, focus groups, public hearings, and other means of determining

hunter values and opinions and provide summations of these to policy makers.
Action 1.3.2: Continue to annually publish the Spittin' and Drummin' Wild Turkey report.

Strategy 1.4: Strengthen existing partnerships with other state/federal agencies and non-governmental organizations influencing wild turkey habitat. Form new partnerships with nontraditional partners that share goals and objectives which fit with turkey management.
Action 1.4.1: Develop an annual or biennial assembly of other natural resource agencies to discuss wild turkey issues and strategies to improve wild turkey management (see also Action 1.1.4).
Action 1.4.2: Create an internal or cooperative personnel position which can serve as liaison with the U.S. Forest Service and other governmental landholding agencies to increase cooperation on partnership lands.
Action 1.4.3: Form partnerships with realtor, forestry, and other groups to ensure private landowners are aware of MDWFP technical guidance opportunities on private lands.

ELEMENT 2. MONITORING OF MISSISSIPPI'S WILD TURKEY POPULATION

Objective: The MDWFP should seek to collect comprehensive data on wild turkey populations at scales which accurately inform policy decisions and evaluate management actions.

Strategy 2.1: Collect gobbler harvest data that can accurately and efficiently provide harvest estimates at necessary scales (statewide, regional, and county).
Action 2.1.1: Implement a mandatory reporting system for all harvested wild turkeys.
Action 2.1.2: Explore other options to acquire county-level harvest estimates, such as expanded or more targeted post-season random hunter surveys.

Strategy 2.2: Expand the scope and value of the Spring Gobbler Hunting Survey.
Action 2.2.1: Undertake campaigns to expand individual participation in the SGHS to include at least 5% of estimated Mississippi turkey hunters.
Action 2.2.2: Expand participation so each region has ≥30 active SGHS hunting clubs.
Action 2.2.3: Identify areas of Mississippi with inadequate SGHS representation.
Action 2.2.4: Develop cell phone apps or other technologies for electronic SGHS data collection and real time data acquisition.
Action 2.2.5: Incorporate methods to collect spatial data for SGHS observations.
Action 2.2.6: Provide SGHS data summaries in useful ways for hunters.
Action 2.2.7: Work with researchers to develop novel utilization of SGHS data.

Strategy 2.3: Expand the scope and value of the summer wild turkey brood survey.
Action 2.3.1: Establish a directive from the MDWFP Executive Office emphasizing the brood survey as an agency priority.
Action 2.3.2: Expand participation among other natural resource partner organizations.
Action 2.3.3: Identify areas of Mississippi with inadequate brood survey representation.
Action 2.3.3: Experiment with SGHS hunters as participants in the brood survey.

Strategy 2.4: Improve wild turkey disease monitoring so disease prevalence can be estimated.
Action 2.4.1: Work with the Southeast Cooperative Wildlife Disease Study Group, the Mississippi State University School of Veterinary Medicine, and USDA Wildlife Services to develop ways to randomly assess wild turkey diseases (i.e., move toward proactive disease monitoring).
Action 2.4.2: Undertake studies to determine if aflatoxins in "deer corn" sold throughout the state may be at levels impactful to wild turkeys.
Action 2.4.3: Develop an internet-based form through which the public can report sightings of diseased wild turkeys.

Strategy 2.5: Develop protocols to acquire and better utilize WMA turkey hunter data.
Action 2.5.1: Strengthen reporting compliance of daily user cards during turkey season.
Action 2.5.2: Expand availability of WMA hunter observation data to WMA biologists, supervisors, managers, and the hunting public.

Strategy 2.6: Explore other population monitoring techniques which could improve assessments of wild turkey populations.
Action 2.6.1: Investigate trail camera use to monitor turkey populations.
Action 2.6.2: Incorporate turkey observations into MDWFP bow hunter and/or other deer hunter observational surveys.

Strategy 2.7: Design methodology to directly monitor wild turkey population response to areas undergoing significant turkey habitat management.

Strategy 2.8: Utilize expert opinion (biologists, natural resource professionals, Conservation Officers, etc.) to develop a statewide map of wild turkey density and abundance.

ELEMENT 3. WILD TURKEY POPULATION MANAGEMENT

Objective: The MDWFP should promote, facilitate, and undertake practices addressing limiting factors to turkey abundance.

Strategy 3.1: Encourage forestry, agricultural, and other land use practices which enhance wild turkey habitats on statewide private lands.

Action 3.1.1: Increase MDWFP private land technical guidance capacity and efficiency.
Action 3.1.2: Annually provide training opportunities to MDWFP personnel to increase knowledge on wild turkey habitat needs and management practices.
Action 3.1.3: As part of MDWFP Private Lands Program (PLP) strategic planning, identify major habitat issues limiting turkeys in each PLP region and develop targeted plans of action to address them.
Action 3.1.4: Foster working relationships with outside partners that offer private land technical guidance and cost-share, including NWTF, NRCS State Technical Committee, NRCS local working groups, Mississippi Forestry Commission, USDA Farm Services Agency, Soil and Water Conservation Districts, etc.
Action 3.1.5: Work with other governmental or nonprofit organizations to prioritize cost-share practices beneficial to wild turkeys. If appropriate, market these practices as part of a "Wild Turkey Habitat Initiative" or similarly titled program for emphasis.
Action 3.1.6: Continue to support, develop, or expand agency-based incentive programs for private land habitat management (i.e., Fire on the Forty, etc.).
Action 3.1.7: Work with the Mississippi Forestry Association (MFA), Mississippi Forestry Commission, and forest industry organizations to develop and promote forestry Best Management Practices and expand to include specific allowances for wild turkeys.
Action 3.1.8: Seek agency involvement in habitat based initiatives for other wildlife with similar ecological requirements. Likewise, seek agency involvement in policy development or resource groups for land use practices creating habitat for wild turkeys (e.g. MFA, Cattleman's Association, forest carbon credit market, etc.).

Strategy 3.2: Manage for high quality wild turkey habitat where appropriate on MDWFP Wildlife Management Areas.

Action 3.2.1: Work with WMA biologists to develop or revise comprehensive management plans for all MDWFP WMAs providing wild turkey hunting opportunities.
Action 3.2.2: Annually meet with representative staff from each MDWFP WMA providing turkey hunting opportunities to review wild turkey related management needs.
Action 3.2.3: Annually provide training opportunities to MDWFP WMA personnel to increase knowledge on wild turkey habitat needs and management practices.
Action 3.2.4: Catalog equipment needs for MDWFP WMAs providing turkey hunting.
Action 3.2.5: Increase utilization of GIS, database management, and other technologies in WMA decision making.
Action 3.2.6: Promote comprehensive habitat project submissions to the Mississippi Chapter of the National Wild Turkey Federation for funding through the Super Fund.
Action 3.2.6: Identify and seek to acquire nontraditional grants and other funding opportunities for WMA habitat enhancement, particularly those for wildlife of special conservation concern sharing wild turkey habitat.

Strategy 3.3: Partner with other governmental land holding agencies to incorporate wild turkey habitat needs into land management planning.

Action 3.3.1: Create an internal or cooperative personnel position which can serve as liaison with the U.S. Forest Service and other governmental landholding agencies to increase cooperation on partnership lands (see also Action 1.4.2).
Action 3.3.2: Proactively pursue cooperative habitat management opportunities on US Forest Service, US Fish and Wildlife Service, and Army Corps of Engineer lands.

Strategy 3.4: Develop and promote effective wild turkey predator management.

Action 3.4.1: Educate landowners and turkey hunters on impacts of predators, predator-habitat relationships, and predator management options.
Action 3.4.2: Annually conduct predator management workshops.
Action 3.4.3: Create a permit system so that landowners can control predators outside of the regular trapping season similar to deer depredation permits.
Action 3.4.4: Create and maintain a list of trappers to be provided to landowners in need of predator removal.
Action 3.4.5: Facilitate relationships between recreational raccoon hunters, turkey hunters, and landowners.
Action 3.4.5: Evaluate and address WMA regulations to encourage legal trapping.
Action 3.4.6: Discourage practices which may increase predation rates on wild turkeys, such as active feeders during the turkey nesting season.

Strategy 3.5: Develop technical guidance protocols to diminish or mitigate disease exposure to turkey populations.

Action 3.5.1: Continually identify issues significant to the spread of turkey diseases.
Action 3.5.2: Develop Best Management Practices (BMPs) for potential turkey disease vectors (wildlife feed, chicken litter fertilizer, etc.).

ELEMENT 4. WILD TURKEY HARVEST MANAGEMENT

Objective: The MDWFP should provide turkey hunting opportunities which satisfy hunters and yield quality outdoor experiences.

Strategy 4.1: Examine turkey hunter satisfaction as it relates to regulatory policy.
Action 4.1.1: Annually survey turkey hunter satisfaction following the spring season (see also Action 1.3.2).
Action 4.1.2: Correlate hunter satisfaction indices back to metrics such as harvest per unit of effort, gobbling activity, etc.
Action 4.1.3: Communicate scientific findings on spring season timing and length to policy makers and hunters.
Action 4.1.4: Develop surveys to understand hunter attitudes toward the balance between liberal vs. conservative frameworks and annual hunting quality.

Strategy 4.2: Develop banding studies to estimate gobbler harvest rates under current and future season frameworks.

Strategy 4.3: With consideration to information attained from strategies 4.1 and 4.2, critically evaluate statewide spring season structure, and make changes if necessary.

Strategy 4.4: With consideration to strategies 4.1-3, explore potential for data-driven adaptive harvest management, where frameworks are adjusted as needed to maintain hunting quality.

Strategy 4.5: Critically assess hunting frameworks on WMAs on case by case basis, regardless of strategy 4.3's outcome.

Strategy 4.6: Critically assess existing fall, either-sex season, and decide whether to expand, decrease, or end this special opportunity.

ELEMENT 5. WILD TURKEY RESEARCH

Objective: The MDWFP should acquire the best available science to guide wild turkey management.

Strategy 5.1: Support and promote hiring researchers with game bird knowledge at in-state universities.

Strategy 5.2: Continue current research on wild turkey landscape and population ecology.

Strategy 5.3: Develop models to assess statewide turkey habitat change through time.

Strategy 5.4: Include assessments of predator community impacts into relevant turkey studies.

Strategy 5.5: Develop studies of turkey population demographics through time.

Strategy 5.6: Facilitate dissemination of research findings to policy makers and lay audiences.
Action 5.6.1: Request that MDWFP-MSU cooperative projects have an accompanying two to five page executive summary which is more detailed than a typical abstract.
Action 5.6.2: Create a summary database of past Eastern wild turkey research projects, particularly those from Mississippi, available to, and understandable by, lay audiences.

ELEMENT 6. ENFORCEMENT OF WILD TURKEY HUNTING REGULATIONS

Objective: The MDWFP should seek to minimize unlawful exploitation of Mississippi's wild turkey resource.

Strategy 6.1: Adopt methods to effectively enforce the turkey bag limit.
Action 6.1.1: Implement a mandatory physical tagging and harvest reporting system for turkeys (see also Action 2.1.1).

Strategy 6.2: Identify problem areas of the state where illegal harvest may be significant and limiting to the population.
Action 6.2.1: Where problem areas are identified, devise specific strategies to address illegal turkey harvest.

Strategy 6.3: Identify equipment needs to enhance efficiency in working wild turkey poaching cases.

Strategy 6.4: Revise language of the supplemental feeding rule to disallow or minimize grain use for supplemental feeding during spring turkey season.

Strategy 6.5: Enact outreach campaigns to promote more ethical sportsmanship.

ELEMENT 7. OUTREACH AND EDUCATION OF WILD TURKEY ISSUES

Objective: The MDWFP should seek to increase understanding of wild turkey ecology and management by sportsmen, landowners, and the general public.

Strategy 7.1: Develop high-quality publications on all aspects of turkey ecology.
Action 7.1.1: Complete and publish MDWFP-MSU Extension publication on wild turkey ecology and management in Mississippi.
Action 7.1.2: Develop one page guides on wild turkey BMPs.

Stragegy 7.2: Develop "how to" Youtube videos and other visual media on aspects of habitat management, predator management, and turkey ecology.

Strategy 7.3: Continue to conduct and expand "game bird" workshop series with MSU.
Action 7.3.1: Include predator management workshops in conjunction with current game bird workshop format.

Strategy 7.4: Continue to annually publish the "Spittin' and Drummin'" Wild Turkey report. Expand content to include additional available data and updates on accomplishments of strategic plan objectives.

Strategy 7.5: Utilize the MS Outdoors television show to convey important turkey conservation messages.
Action 7.5.1: Develop a MS Outdoors television episode highlighting relevant wild turkey issues in Mississippi.
Action 7.5.2: Following implementation of Action 2.1.1/6.1.1, include shots of hunters applying tags and/or reporting all turkeys harvested on MS Outdoor television segments.

Strategy 7.6: Cultivate relationships with high-profile Mississippi-based turkey hunters for delivery of turkey conservation messaging.

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Average Value	Range	Year(s)	Location	Study Citation	Comments
HEN SURVIVIAL (percentage of the hen population that survives through the year)					
51%	22.4 - 77%	1984-94	Tallahala WMA	Miller et al. (1998a)	
68%	49.9 - 81%	1987-90	Kemper County	Palmer et al. (1993a)	
38%	---	1994-95	Delta NF / Twin Oaks WMA	Chamberlain (1995)	
40%	---	1999-00	Leaf River WMA	Inglis (2001)	
68%	62 - 73%	1999-00	Caston Creek WMA	Jones (2001)	
52%	31 - 72%	2003-04	Malmaison WMA	Holder (2006)	Juvenile hen survival
62%	50 - 74%	2003-04	Malmaison WMA	Holder (2006)	Adult hen survival
54%	51 - 57%	2009-10	Quitman County; Interior Delta region	Marable (2012)	
GOBBLER SURVIVIAL (percentage of the gobbler population that survives through the year)					
46%	39 - 54%	1986-90	Tallahala WMA	Godwin et al. (1991)	Juenile and adults gobblers combined
68%	61 - 71%	1998-00	3 WMAs & 1 NWR	Wieme (2001)	Juvenile gobblers (jakes) only
72%	---	2003	Malmaison WMA	Holder (2006)	Juvenile gobblers (jakes) only
42%	---	2004	Malmaison WMA	Holder (2006)	Adult survival only
POULT SURVIVAL (percentage of poults surviving specified time period)					
23%	0 - 41%	1984-92	Tallahala WMA	Palmer et. al (1993b)	Poult survival to >50 days old
26%	---	1984-96	Tallahala WMA	Miller et al. (1998b)	Poult survivial to August 1
65%	---	1999-2000	Leaf River WMA	Inglis (2001)	Chance of 1 poult per brood surviving 2 weeks
66%	---	1999-2000	Caston Creek WMA	Jones (2001)	Chance of 1 poult per brood surviving 2 weeks
GOBBLER HARVEST RATE (percentage of gobblers harvested in the spring season)					
26%	15 - 40%	1984 - 1989	Tallahala WMA	Palmer et al. (1990)	All males (includes jakes)
35%	16 - 53%	1984-92	Tallahala WMA	Lint et al. (1993)	Adult gobblers only (range for 1984-89 only)
22%	7 - 42%	1984-92	Tallahala WMA	Lint et al. (1993)	All males (includes jakes)
29%	25 -33%	1994-95	Delta NF / Twin Oaks WMA	Chamberlain (1995)	All males (includes jakes)
64%	---	2004	Malmaison WMA	Holder (2006)	Adult gobblers only
NESTING RATE (percentage of hens that initaite a nest)					
72%	0 - 100%	1984-95	Tallahala WMA	Miller et al. (1998b)	
35%	0 - 100%	1984-95	Tallahala WMA	Miller et al. (1998b)	Renesting rate
63%	34.7 - 100%	1987-94	Kemper County	Miller et al. (1995)	
23%	0 - 41.7%	1987-94	Kemper County	Miller et al. (1995)	Renesting rate
83%	78 - 88%	1999-00	Leaf River WMA	Inglis (2001)	
66%	62 - 69%	1999-00	Caston Creek WMA	Jones (2001)	
NEST SUCCESS (percent of nests that successfully hatch)					
48%	---	1984-88	Tallahala WMA	Seiss et. al (1990)	
28%	16.7 - 62.5%	1984-95	Tallahala WMA	Miller et al. (1998b)	Initial nesting attempts only
25%	0 - 100%	1984-95	Tallahala WMA	Miller et al. (1998b)	Renest attempts only
38%	14.3 - 57%	1987-94	Kemper County	Miller et al. (1995)	Initial nesting attempts only
24%	0 - 50%	1987-94	Tallahala WMA	Miller et al. (1995)	Initial nesting attempts only
19%	10 - 27%	1994-95	Delta NF / Twin Oaks WMA	Chamberlain (1995)	
34%	29 - 39%	1999-00	Leaf River WMA	Inglis (2001)	
39%	21 - 56%	1999-00	Caston Creek WMA	Jones (2001)	
HEN SUCCESS (percent of hens that sucessfully raise at least one poult)					
25%	5 - 60%	1984-95	Tallahala WMA	Miller et al. (1998b)	
34%	33 - 35%	1999-00	Leaf River WMA	Inglis (2001)	
26%	12 - 39%	1999-00	Caston Creek WMA	Jones (2001)	

- Tag system is needed during turkey season. Higher fines for violators.
- While tagging and harvest reporting isn't a cure for the problem it's certainly a needed and useful tool to help protect and maintain our turkey population. As a hunter and an officer a turkey tagging program is long overdue.
- Definitely need tagging.
- Mandatory tagging and reporting will benefit by providing more precise data at the local and statewide level. The data will also deter over limit harvest.
- Supplemental feed should not be allowed due to disease concerns and impact on turkeys.
- Restocking program throughout the state.
- I think that the past 2 years of high water has had an impact on the turkeys in W. Claiborne County.
- Feeding should not be allowed during turkey season.
- I haven't been working in my county long enough to give adequate response to #3. However in talking with local hunters a tag system is needed due to over hunting by some.
- Stay the same in Perry County (in regards to bag limit).
- Make out of state hunters tag turkeys. Lower bag limit for out of state hunters.
- Need tagging!!
- Tagging issue to allow LE a chance to enforce over limits.
- Season should end early.
- Turkey in my area peaked 10-15 years ago. Have been seeing fewer birds in recent years, but probably stable variations last 5 years. Seeing heavy gobbling/breeding activity after season is over last 2-3 years.
- This season was good in Wayne County. Not a lot of turkeys killed; but hunters were hearing and seeing turkeys.
- Mandatory turkey tagging and mandatory harvest reporting.
- Some of the questions I have no clue about because I'm a new officer. Only been on 3 months in the field.
- Believe habitat changes can greatly help turkeys.
- I don't have hardly any turkeys in my County.
- Season starts too early and ends about right. Supplemental feed portion that allows grain needs to be gone. Hogs are impacting the hatch I believe.
- No bait!
- A more strict harvest system (tag) or season.
- Need a way to track how many turkeys a person has killed per season in order to know how many they have left to kill.
- Predator control - during nesting.
- Tagging system that Law Enforcement can tell how many birds a hunter has already harvested.
- Shorter season, tag turkey, Stop Fall turkey season. If those counties are over populated (trap) and place in the underpopulated counties. 2 Turkey limit. I have 1,000 acres that used to have birds and nothing to hunt now and it wasn't from hunting.
- Season needs to be shortened at least by half. We need a tagging system. No way to keep up with people. Marion WMA season needs to be put back like it was.
- Predators are playing big factor on nest destruction as well as killing grown turkey. I have seen multiple nest disturbed as well personally seen bobcat catch turkey.
- Predators.
- Quitman Co. has been closed for the last 6 years and turkeys were released and doing fairly well.
- I believe with the published amount of seed that can be broadcast during spring and supplemental feeding people can be misled to think it is OK to hunt around bait.
- Strongly support a mandatory tag system.
- I strongly support a tagging system for turkey hunting as well as deer hunting. Supplemental feeding also affects they turkey population based on the evidence provided by MDWFP biologists. A tagging system will have a positive impact on the turkey population.
- Some of the best locations for turkey have been clear cut of woodland
- Think the supplemental feeding is going to be a BIG issue. No corn or grain allowed during turkey season.
- Supplement feeding corn or grain during turkey season does not need to happen.
- No way to know the impact of violations without a tagging system. But feel it is significant over harvest. Need tagging system.
- Without a tagging system no way to track bag limits.
- I strongly support a mandatory tagging system with a physical tag attached to turkey. Change legal hunting hours to 30 minutes before sunrise to 2 pm or noon.
- Most avid turkey hunters will harvest over the limit if possible. This is only my opinion but I feel this is a larger problem that we realize.
- Physical tagging requirement, stiffer fine if not physically tagged, loss of privilege if convicted of violations in 3 year period.
- Most hunting in Bolivar is along MS River and the clubs inside levee have more restrictive regulations on turkeys if needed. High water, limited turkey sightings, etc.
- I have had significant complaints about turkey being included in the supplemental feed changes.
- Possible state wide fall season do it in October before deer rifle (season) opens.
- Tag both legs. Season starts early but it should consist of being in line with spring break so kids would have opportunity.
- Season starts early and affects youth hunting. Should not be able to feed and hunt turkeys.
- Stop hunting at noon. Zone state. Cut season to 4 weeks. Stop feeding.
- Loss of habitat and technology, keep educating public.
- US Forest Service burn thousands of acres at one time during nesting season.
- Research needs to be done on the use of chicken litter and the impact on turkeys. Tagging should be mandatory. Fur prices would help relieve predators.
- Bag limit is only on paper and is only obeyed by a select few hunters. Tagging turkey will allow officer to check legal limits.
- Enforcing bag limit is virtually impossible, unless you're lucky enough to catch a violator coming out with 2 birds. NEED TAGGING!
- Impossible to enforce bag limit without a tagging system. Introduce and educate more youth to turkey hunting. Too much emphasis on deer hunting.
- You have toughly 50,000 turkey hunters in the state that kill roughly less than one bird a year. You have roughly 50,000 birds in this state. This new feeding when allowed with modern firearms and crossbow will lead to those 50k killing 2-3 birds a year.

- Definitely need to continue a fair chase hunt - calling turkey and outsmarting. If hunters are allowed to bait I strongly feel that my child will never get to experience the resource I have enjoyed. We will have ambush hunters and the wild turkey population will decline to the point of no return.
- Work alongside DEQ about (chicken) layer fertilizer.
- Declined due to the new feeding regulation.
- Stop the feeding and baiting.
- Restrict feeding during turkey season.
- Clover planting for turkey is very needed.
- Due to the trend in wild life feeding regulations it is a must for tagging system to be implemented for turkeys.
- Stop hunting at 12:00 or 2:00 at least for part of season.
- Beware of supplemental feeding.
- Require tags for nonresident turkey hunters.
- Concerns about feeding corn or grain products during turkey season.
- Supplemental feeding law to not include turkey hunting. We need a mandatory tagging system.
- I think season should start on April 1st and end May 1st.
- Stop putting out chicken fertilizer
- More turkeys seen now in Tishomingo County than any time I've seen.
- Tagging system would be a big help.
- We got to have a stronger way to enforce the over killing and over hunting.
- Limit needs to be decreased. Season needs to be shortened. Tagging regulation needs to be installed.
- I believe bag limits and season framework is pretty close to appropriate as long as a mechanism is in place to monitor bag limits and actual take.
- In my opinion a tagging and reporting system is a valuable and enforceable solution to the population decline in my area - Lawrence County, MS.
- Tagging system would enhance law enforcement. I think eating corn and cutting timber have greatly hurt the turkey population.
- We really need a tagging system.
- Ban feeding of grain from February 15 - May 30.
- The areas that have significant flooding on a regular basis is really hurting turkey numbers.
- Reduce the bag limit to 1 based on the decline in populations and over harvest. Although I haven't worked in the county long I have hunted it and surrounding counties.
- Timber harvest, overharvest and supplemental feeding in my opinion have had the greatest impact in this area.
- Spring season is starting too early. A lot of hunters in my county are interested in the fall season but don't have the required amount of land. Could the required # of acres be decreased?
- Current season in North MS starts too early.
- Season opens too early.
- Need a tagging system.
- Strongly support a "Fool Proof" tagging system.
- In my opinion we have never had as many predators and egg eaters as today with coons, skunks, possum and fox being egg eaters and bobcats being the top predator.
- A 3 year trapping program works very well and should be promoted by the agency.
- We need serious habitat improvement considerations for Red Creek WMA and Little Biloxi WMA. I feel that supplemental plots and other habitat improvements would do a long way in restoring population in my area.
- 1. Establish a tagging system 2. Lower the non-resident bag limit 3. Move the opening day back 4. Look at the feeding law and the direct effect to turkey disease.
- A tagging system would help on bag limit violations. I think the season is about 2 weeks too long.
- Population declined because of timber harvest. No fall Turkey season. Need a turkey tagging system.
- I believe supplemental feeding has impacted number of turkeys killed and is part of the declining numbers. I also feel that fines should hold a harsher penalty for violations.
- I believe the supplemental feeding has hurt the turkey population due to diseases. It will only get worse due to allowing it in line of site for deer hunters.
- 1. Limit feeding regulations during turkey season and make fine for violation higher. 2. Limit non-resident bag limit & have tagging system!!!

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