Southeast Deer Study Group

30th Annual Meeting

Ocean City, Maryland
February 25-27, 2007

Deer and Their Influence On Ecosystems

Hosted by the
Maryland Department of Natural Resources

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The Southeast Deer Study Group

The Southeast Deer Study Group was formed as a subcommittee of the Forest Game Committee of the Southeastern Section of The Wildlife Society. The Southeast Deer Study Group Meeting is hosted with the support of the directors of the Southeastern Association of Fish and Wildlife Agencies. The first meeting was held as a joint Northeast-Southeast Meeting at Fort Pickett, Virginia, on September 6-8, 1977. Appreciating the economic, aesthetic, and biological values of the white-tailed deer (*Odocoileus virginianus)* in the southeastern United States, the desirability of conducting an annual Southeast Deer Study Group meeting was recognized and urged by the participants. Since February 1979, these meetings have been held annually for the purpose of bringing together managers, researchers, administrators, and users of this vitally important renewable natural resource. These meetings provide an important forum for the sharing of research results, management strategies, and discussions that can facilitate the timely identification of, and solutions to, problems relative to the management of white-tailed deer in our region. The Deer Subcommittee was given full committee status in November, 1985, at the Southeastern Section of The Wildlife Society's annual business meeting.

In 2006, Delaware was approved as a member.

TWS Professional Development

The 30th Annual Southeast Deer Study Group meeting can be counted as contact hours for Professional Development/Certification. Each hour of actual meeting time counts as one credit hour (no social time credit). For more information about professional development, visit The Wildlife Society web site, www.wildlife.org.

Southeast Deer Study Group Meetings

Year	Location	Meeting Theme
1977	Fort Pickett, VA	none
1979	Mississippi State, MA	none
1980	Nacogdoches, TX	none
1981	Panama City, FL	Antlerless Deer Harvest Strategies
1982	Charleston, SC	none
1983	Athens, GA	Deer Damage Control
1984	Little Rock, AR	Dog-Deer Relationships in the Southeast
1985	Wilmington, NC	Socio-Economic Considerations in Managing White-tailed Deer
1986	Gatlinburg, TN	Harvest Strategies in Managing White-tailed Deer
1987	Gulf Shores, AL	Management: Past, Present, and Future
1988	Paducah, KY	Now That We Got 'Um, What are we Going To Do with 'Um?
1989	Oklahoma City, OK	Management of Deer on Private Lands
1990	Pipestem, WV	Addressing the Impact of Increasing Deer Populations
1991	Baton Rouge, LA	Antlerless Deer Harvest Strategies: How Well Are They Working?
1992	Annapolis, MD	Deer Versus People
1993	Jackson, MS	Deer Management: How We Affect Public Perception and Reception
1994	Charlottesville, VA	Deer Management in the Year 2004

Southeast Deer Study Group Meetings -continued-

Year	Location	Meeting Theme
1995	San Antonio, TX	The Art and Science of Deer Management: Putting the Pieces Together
1996	Orlando, FL	Deer Management Philosophies: Bridging The Gap Between the Public and Biologists.
1997	Charleston, SC	Obstacles to Sound Deer Management
1998	Jekyll Island, GA	Factors Affecting the Future of Deer Hunting
1999	Fayetteville, AR	QDM- What, How, Why, and Where?
2000	Wilmington, NC	Managing Deer in Tomorrow's Forests: Reality vs. Illusion
2001	St. Louis, MO	From Lewis & Clark to the New Millennium- The Changing Face of Deer Management
2002	Mobile, AL	Modern Deer Management- Balancing Biology, Politics, and Tradition
2003	Chattanooga, TN	Into the Future of Deer Management: Where Are We Heading
2004	Lexington, KY	Today's Deer Hunting Culture: Asset or Liability?
2005	Shepherdstown, WV	The Impact of Today's Choices on Tomorrow's Deer Hunters
2006	Baton Rouge, LA	Managing Habitats, Herds, Harvest, and Hunters in the 21st Century Landscape. Will 29th Century Tools Work?
2007	Ocean City, MD	Deer and Their Influence on Ecosystems
2008	Tunica, MS	

Members of the Deer Committee: Southeastern Section of The Wildlife Society

Dr. Steve Demarais, Chairman – Mississippi State University, MS

Alabama- Chris Cook, AL Dept. of Conservation & Natural Resources
Arkansas- Cory Gray, AR Game & Fish Commission
Delaware- Joe Rogerson, Delaware Division of Fish & Wildlife
Florida- Robert Vanderhoof, FL Fish & Wildlife Conservation Commission
Florida- Steve Shea, St. Joe Timberland Company
Georgia- Jim Simmons, GA Department of Natural Resources
Georgia- Karl Miller, University of Georgia
Kentucky- Tina Brunjes, KY Department Fish & Wildlife Resources
Kentucky- Jon Gassett, KY Department Fish & Wildlife Resources
Louisiana- David Moreland, LA Department Wildlife & Fisheries
Louisiana- Scott Durham, LA Department Wildlife & Fisheries
Maryland- Douglas Hotton, MD Department of Natural Resources
Mississippi- Chad Dacus, MS Department of Wildlife, Fisheries & Parks
Missouri- Jeff Beringer, MO Department of Conservation
Missouri- Lonnie Hansen, MO Department of Conservation
North Carolina- Evin Stanford, NC Wildlife Resources Commission
North Carolina- J. Scott Osborne, NC Wildlife Resources Commission
Oklahoma- Ken Gee, The Noble Foundation
Oklahoma- Michael Shaw, OK Department of Wildlife Conservation
South Carolina- David Guynn, Jr., Clemson University
South Carolina- Charles Ruth, SC Department of Natural Resources
Tennessee- Ben Layton, TN Wildlife Resources Agency
Tennessee- Daryl Ratajczak, TN Wildlife Resources Agency
Texas- Mitch Lockwood, TX Parks & Wildlife Department
Texas- Bob Zaiglin, Southwest Texas Junior College
Virginia- W. Matt Knox, VA Department of Game & Inland Fisheries
Virginia- Nelson Lafon (alternate), VA Dept. of Game & Inland Fisheries
West Virginia- Jim Crum, WV Division of Natural Resources

Southeast Deer Study Group Awards

Career Achievement Award

1996- Dr. Richard F. Harlow
1997- Dr. Larry Marchinton
1998- Dr. Harry Jacobson
1999- Dr. David C. Guynn, Jr.
2000- Joe Hamilton
2002- Robert L. Downing
2004- Dr. Charles DeYoung
2005- Kent Kammermeyer
2006- Bill Armstrong

Outstanding Student Presentation Award

1996- Billy C. Lambert, Jr. (Texas Tech University)
1997- Jennifer A. Schwartz (University of Georgia)
1998- Karen Dasher (University of Georgia)
1999- Roel R. Lopex (Texas A&M University)
2000- Karen Dasher (University of Georgia)
2001- Roel R. Lopez (Texas A&M University)
2002- Randy DeYoung (Mississippi State University)
2003- Bronson Strickland (Mississippi State University)
2004- Randy DeYoung (Mississippi State University)
2005- Eric Long (Penn State University)
2006- Gino D'Angelo (University of Georgia)

ABSTRACTS

Monday, February 26, 2007

Plenary Session – Palm Room 3, 4, 5

Doug Hotton, Moderator

8:00 – 8:20 a.m. Welcome and Instructions

8:20 – 8:50 a.m.

Consequences of Excessive Deer Herbivory to Serpentine Ecosystem Recovery at Soldiers Delight Natural Environment Area in Maryland

Wayne Tyndall – Maryland Department of Natural Resources

Soldiers Delight Natural Environment Area is the most significant biodiversity site on State lands in Maryland, and more than 1,000 acres have been designated a State Wildlands to protect an imperiled serpentine ecosystem. Most of the total coverage of serpentine ecosystems throughout the eastern United States is now restricted to the Wildlands portion of Soldiers Delight NEA. This indigenous ecosystem supports at least 36 rare, threatened, or endangered species, including a near-endemic species and a Federally listed taxon, plus a State endangered oak savanna ("*barrens*") community. Restoration of the serpentine ecosystem began in 1996, after a five-year research phase. However, the burgeoning white-tailed deer population is significantly inhibiting ecosystem recovery. In the absence of deer predation and hunting, the population has increased excessively since the 1980s. A self-sustaining population of the State Endangered Fringed gentian is not possible because of inadequate reproductive output due to excessive flower consumption, and to trampling of seedlings by deer. Excessive herbivory may be the most important contributing factor in the recent decline of a Federally Endangered wildflower. Inflorescences of one of the most important nectar plants for butterflies, bee flies, and other insects (Blazing star) are excessively grazed by deer, often in the flower bud stage. And reestablishment of indigenous oaks is being significantly inhibited by browsing of seedlings to near ground level; oak seedlings and saplings are important host plants for butterflies and other insects, including the State Endangered Edwards hairstreak. Ecosystem recovery will be dependent upon a significant decrease in deer herbivory.

NOTES:

Monday , 8:50 – 9:20 a.m.

Vegetation Characteristics and Densities of Breeding Birds and Deer at Catoctin Mountain Park and the Frederick City Watershed

Scott Bates – NPS National Capital Region; Deanna Dawson, Andy Royle – USGS Patuxent Wildlife Research Center

At Catoctin Mountain Park (CATO), a unit of the National Park Service in Frederick County, Maryland, deer populations have exceeded normal densities for the last 25 years. While tree regeneration had been monitored at CATO, the possible effects of deer on other taxa had not been studied. Because NPS units must document valid scientific research to support wildlife management activities, the NPS teamed with the United States Geological Survey's Biological Resources Discipline in 2002 to sample forest vegetation characteristics and survey deer and breeding bird species in CATO and in the nearby Frederick City Watershed Cooperative Wildlife Management Area (FCW), where deer are managed by the Maryland Department of Natural Resources. In both study areas, forest vegetation and breeding birds were sampled at 35 random points within chestnut oak-dominated stands and spotlight surveys of deer were conducted along roads. Distance sampling methods were used to estimate densities of deer and breeding birds. FCW had higher tree regeneration than did CATO, more understory cover and biodiversity between 0.3 to 5 feet, and a higher density of ground-nesting birds. CATO had a more diverse overstory and ten times the deer density. Deer management at FCW is a benefit to plant and avian taxa and should be implemented at CATO.

NOTES:

Monday , 9:20 – 9:50 a.m.

The Influence of Deer and Horse Herbivory on a Mid-Atlantic Barrier Island Ecosystem

Mark Sturm – NPS Assateague Island National Seashore

Abstract: White-tailed deer (*Odocoileus virginianus*), sika deer (*Cervus nippon*) and feral horses (*Equus caballus*) inhabit Assateague Island, a 37 mile long undeveloped barrier island located along the Atlantic coast of Maryland and Virginia. The effects of these ungulate populations on Assateague's terrestrial habitats are profound. Between 2003 -2005, island shrub and maritime forest communities were subjected to an exclosure experiment where treatments included exposure to horse and deer herbivory, exposure to deer herbivory - rest from horse herbivory and rest from all ungulate herbivory. Overall herbivory was found to be reducing plant species diversity and altering plant community composition. In response to deer herbivory *Acer rubrum* (saplings), *Cirsium* spp., *Eupatorium hyssopifolium, Solidago sempervirens, Lechea maritima, Vitis rotundifolia, Rubus* spp. and *Carex* spp. exhibited significantly lower abundances (á = 0.05) while *Scirpus pungens* significantly increased in abundance. Additionally, in response to deer herbivory the average height of *Myrica* spp. and *Dichanthelium acuminatum* significantly increased while that of *Solidago sempervires* significantly decreased. Other monitoring has revealed that deer and horse herbivory combined is reducing the survival and reproductive success of *Amaranthus pumilus*, a species that is federally listed as threatened. These plant taxa, along with others that exhibited responses specific to horse herbivory, are under consideration as indicator species that will be used during the development of an adaptive management program. This program will monitor the effects of each ungulate population and provide essential information for developing management strategies for these populations as well as the barrier island ecosystem.

NOTES:

Monday, 9:50 – 10:10 a.m. Break – Palm Room 1, 2

Technical Session I – Palm Room 3, 4, 5

Steve Bittner, Moderator

Monday, 10:10 – 10:20 a.m. Instructions and Door Prizes

10:20 – 10:40 a.m.

Temporal and Spatial Aspects Associated with Deer Browse on Soybeans

Greg Colligan, Jacob L. Bowman, Joseph E. Rogerson – University of Delaware

Soybean crops are an integral component of agribusiness in the Southeast. White-tailed deer (*Odocoileus virginianus*) browse can affect soybean yields in small, secluded fields in areas with high deer densities. Little is understood regarding the spatial and temporal distribution of deer browsing on soybeans fields. Additionally, many repellents and scaring devices are only effective for a short period of time. A better understanding of the spatial and temporal aspects of deer browse on soybeans may make short term crop protection methods more feasible. In 2004 – 2006 we investigated spatial and temporal aspects of deer browse within soybean fields. We also investigated the relationships between intensity of deer browse and diet change, plant chemical defense, plant phenology, and increase in soybean leaf biomass. We examined browsing patterns within single-crop and double-crop soybean fields in Little Creek, Delaware. Each of our study fields was bordered on one side by forest. We systematically placed 4.6 m^2 plots (n = 610) at 10 m intervals. We measured browse rates every 7-10 days, starting 1 week after plant emergence. Browse rates were greatest in the first 3 weeks after plant emergence. In 2004, browse rates decreased significantly after week 3 in both the single and double crop fields ($P<0.0001$ and $P<0.0001$). In 2005, browse rates differed among weeks in the double crop field ($P< 0.0274$), but not in the single crop fields ($P<0.1992$). Browse decreased significantly, in both single ($P< 0.0001$) and double crop fields ($P< 0.0001$) 1 week after plant emergence in 2006. In 2004 - 2006, browse was most intense = 20 m from field edge, in single crop fields (2004: $P< 0.0001$, 2005: $P< 0.0058$, and 2006: $P < 0.0264$). Browse rates were not affected by distance from field edge in double crop fields in 2005 or 2006 ($P< 0.0820$ and $P< 0.0864$). Browse rates were significantly lower at distances <10m in 2004 double crop fields ($P<0.0001$). These data suggest that protection methods only need to be effective for a relatively short period of time (1- 3 weeks) and cover a relatively small area (= 20 m from field edge). Hence, short term protection methods, may be feasible in situations where deer browse has a significant negative effect on soybean crop yields.

NOTES:

Monday, 10:40 – 11:00 a.m.

White-tailed Deer Habitat: Effects of Deer Density and Supplemental Feeding

Timothy E. Fulbright, Charles A. DeYoung, David G. Hewitt, Reagan Gage, Eric Grahmann, Ryan Darr, Garrett Timmons, Aaron Foley – Caesar Kleberg Wildlife Research Institute; Don A. Draeger – Comanche Ranch

We initiated a long-term research project on the Comanche and Faith Ranches in South Texas in 2003 to determine effects of deer density and supplemental feeding on white-tailed deer and their habitat. On each ranch, we built 6 high-fenced, 200-acre enclosures. These 6 enclosures are divided into 3 density pairs—2 enclosures have high deer densities (40 deer); 2 have medium deer densities (25 deer); and 2 have low deer densities (10 deer). Deer are added or removed to maintain densities as near the target density as possible. For each pair of enclosures with a given density, one is supplementally fed with 2 feeders containing pelleted feed in the center of the enclosure and one is not supplementally fed. Vegetation canopy cover and biomass are estimated annually during summer. Browse and forb canopy cover and biomass, and forb species richness were similar ($P > 0.05$) in supplementally fed and unfed enclosures, averaged across data collected during summer 2004-2006. High density enclosures supported lower ($P < 0.05$) forb species richness and canopy cover than low density enclosures. Deer density had no significant ($P > 0.05$) effect on canopy cover of highly palatable browse species or unpalatable browse species. Canopy cover of moderately palatable browse species was less ($P < 0.05$) in high density enclosures than in low density enclosures. Browse biomass was similar ($P > 0.05$) among deer densities. Increasing deer density appears to impact vegetation similarly with and without supplemental feeding.

NOTES:

Monday, 11:00 – 11:20 a.m.

Supplemental Feed and Deer Density Effects on Deer Foraging

Garrett R. Timmons, David G. Hewitt, Charles A. DeYoung, Timothy E. Fulbright, Stephen L. Webb, Nate Newman, Mark Richman, Aaron Foley – Caesar Kleberg Wildlife Research Institute; Don A. Draeger – Comanche Ranch

Whether or not habitats can support higher deer densities with supplemental feeding is a controversial issue. Our objective was to test the hypothesis that diet quality and deer body condition are negatively related to deer density and that supplemental feed will allow deer to forage for higher quality plants and maintain better body condition. Three tame white-tailed deer does (*Odocoileus virginianus*) were permanently released in each of 4-200 acre enclosures. Enclosure treatments were low density (20 ac/deer) - unfed; low density - fed; high density (5 ac/deer) - unfed; and high density - fed. Bite counts were conducted quarterly and body condition scores recorded. Preliminary observations of average yearly body condition scores (scale of 1-5) indicated better condition in fed deer (low density: 4.31, high density: 4.58) versus unfed deer (low density: 3.25, high density: 2.90). Bite count data also indicated lower forage intake rates in fed treatments (low density: 0.71 g/min, high density: 0.62 g/min) versus unfed treatments (low density: 1.04 g/min, high density: 1.08 g/min) in all seasons but summer, possibly an indication of higher diet selectivity in fed deer. Preliminary diet analyses indicated some possible trends in forb intake. The average yearly forb component of diets was higher in low density treatments (fed: 59%, unfed: 30%) versus high density treatments (fed: 32%, unfed: 25%). These results indicated supplemental feed and deer density influence deer foraging patterns, which in turn may influence deer population processes and vegetation communities.

NOTES:

Monday, 11:20 – 11:40 a.m.

Social Structuring of a Central Appalachian Deer Herd and a Test of Localized Management

Brad F. Miller – University of Georgia; Randy W. DeYoung – Caesar Kleberg Wildlife Research Institute; Tyler A. Campbell – USDA National Wildlife Research Center; Ben R. Laseter – University of Georgia; W. Mark Ford – USDA Forest Service; Karl V. Miller – University of Georgia

Localized management has been proposed as a means of using white-tailed deer social behavior for small-scale deer damage control. Herein we describe our investigation of the social structuring of a Central Appalachian, high population-density deer herd, and a test of localized management. A spatial autocorrelation analyses based on pairwise Moran's I among 229 female deer revealed that genetic relatedness was inversely related to the distances between core areas. Additionally, 28 social groups delineated by visual observation had a mean relatedness value within groups of 0.1, a value similar to that of first cousins. This evidence of fine-scale social group structuring indicated that the theoretical basis of localized management applied to our study site. An experimental removal of a social group(s) from a 0.46 mi^2 area was conducted in the winter of 2002. A total of 51 animals were removed via trapping and sharpshooting. Track counts in the snow conducted before, during, and after the removal indicated the removal was largely successful. An additional 31 animals were removed in 2005. When we compared the genetic data collected from the first and second removals, we found evidence of genetic differentiation (significant Fst, and exact tests of differentiation, frequency of private alleles, and Hardy-Weinberg disequilibrium). The large number of animals removed three years after the initial experiment and the evidence of genetic differentiation between the first and second removal groups indicates recolonization by immigrant deer. We therefore conclude that a single application of localized management may not be effective in areas of high deer density.

NOTES:

Monday, 11:40 – 1:00 p.m. Lunch on Your Own

Technical Session II – Palm Room 3, 4, 5

Phil Norman, Moderator

Monday, 1:00 – 1:10 p.m. Instructions and Door Prizes

1:10 – 1:30 p.m.

An Examination of the Visual System of White-tailed Deer

Gino J. D'Angelo – University of Georgia; Michelle A. Pardue – Atlanta VA Medical Center; Gary L. Williams – University of California; George R. Gallagher – Berry College; David A. Osborn, Robert J. Warren, Karl V. Miller – University of Georgia

White-tailed deer (*Odocoileus virginianus*) rely heavily on vision to survive, yet we are limited in our understanding of their visual physiology and its influence on deer behavior. We used a variety of techniques to examine the visual system of white-tailed deer. We conducted discrimination trials with hand-reared captive deer to estimate their visual acuity. Our results suggested that deer visual acuity is similar to other ungulates, but is 80% less than humans with 20/20 vision. As opposed to the optic fovea found in humans, deer possess a visual streak of photoreceptors concentrated in a band across the retina, which we identified using immunohistochemistry to map the location and density of rods and cones. The visual streak provides deer with enhanced ability to scan the horizon with a wide field of view. The visual streak is spatially aligned with a tapetum lucidum, an iridescent membrane attached to the retina which enhances vision in low-light. Our immunohistochemistry experiments revealed the deer retina is dominated by rod photoreceptors, which are responsible for vision in low-light conditions and limited color vision. We identified 2 types of cone photoreceptors in the deer retina, which validates previous electrophysiological research that suggested deer have dichromatic color vision. We also assessed morphologically and histologically the anatomical structures responsible for optical focusing. Our increased knowledge of deer vision provides a foundation toward understanding deer behavior and anti-predation strategies, and may also be useful for developing physiologically based strategies to reduce deer-human conflicts.

NOTES:

Monday, 1:30 – 1:50 p.m.

Coyote Food Habits at the Savannah River Site, SC: The Importance of White-tailed Deer

Joshua D. Schrecengost – University of Georgia; John C. Kilgo, H. Scott Ray – USDA Forest Service; Karl V. Miller – University of Georgia

Burgeoning coyote (*Canis latrans*) populations in many regions of the Southeast have raised questions regarding their impact on fawn survival and white-tailed deer (*Odocoileus virginianus*) population dynamics. To investigate the seasonal importance of deer in the diets of Southeastern coyotes, we collected 415 coyote scats from May 2005 through July 2006 on the Savannah River Site in western South Carolina. Scats contained an average of 15 different food items per month, including plant, insect, mammal, and avian remains. Seasonally available soft mast was the most common food item in 12 of the 15 months we sampled. White-tailed deer was the most common food item during December (40%) and March (37%), and insects were the most common during April (31%). Increased white-tailed deer use during December is likely due to scavenging of carcasses from hunting season. During fawning (May-June), wild plums (*Prunus* spp.) and blackberries (*Rubus* spp.) were the most commonly occurring food items. Fawns were the second (31%, 38%) and fourth (15%, 23%) most commonly occurring food item during May and June of both years, respectively. Given the prevalence of fawn remains in scats during fawning season, our data suggest that coyote predation may have a significant impact on fawn recruitment. However, coyote predation on fawns may be buffered by availability of soft mast. Our study certainly indicates that additional research is warranted to determine the importance of coyote predation on deer population dynamics in the southeastern United States.

NOTES:

Monday, 1:50 – 2:10 p.m.

Coyotes and Deer: An Emerging Management Issue in the Southeast?

John C. Kilgo, H. Scott Ray – USDA Forest Service; Joshua D. Schrecengost – University of Georgia; Grant R. Woods – Woods and Associates; Tom Hughes – National Wild Turkey Federation; Karl V. Miller – University of Georgia

Coyotes (*Canis latrans*) are well-known predators of white-tailed deer (*Odocoileus virginianus*) fawns where both species historically co-occurred. However, biologists generally have not considered coyotes a major influence on deer populations in the Southeast, only recently colonized by coyotes. However, as coyote populations increase across much of the Southeast, anecdotal evidence of the potential impacts is mounting. Our objective is to present such evidence from Georgia and South Carolina in hopes of engendering further discussion and research of the issue. First, deer populations in some counties of this area have declined during the period coincident with the increase in coyote numbers, as evidenced by declining trends in harvest. Second, on the Savannah River Site (SRS), an index of annual recruitment (fawns per doe in the harvest) exhibited a decline coincident with the increase in the coyote population there. Third, a 2006 pilot study of fawn survival at SRS revealed that 4 of 5 fawns radio-collared were depredated by coyotes at less than 1 week of age. Finally, both published and ongoing research in the region demonstrates that fawns are a significant component of coyote diets during spring. Collectively, this and additional evidence suggest that coyotes may impact deer in some situations and that the issue warrants further research and discussion. We will discuss both positive and negative implications of such an impact on deer populations under different management goals and scenarios.

NOTES:

Monday, 2:10 – 2:30 p.m.

Managing Native Warm-season Grasses and Associated Cover for White-tailed Deer

John P. Gruchy, Craig A. Harper – University of Tennessee

Native-warm season grasses (nwsg) provide fawning and escape cover for white-tailed deer. Although nwsg themselves are not readily consumed by deer, various forbs and shrubs may provide quality forage in old-field habitats, depending upon management strategy. If left unmanaged, nwsg become increasingly dense and habitat benefits are reduced. We implemented 4 management practices (October disk, March bushhog, March disk, and March burn) with controls in a completely randomized design on a previously unmanaged nwsg field in McMinn County, Tennessee 2003-04. Vegetation structure and composition were measured during the summer and fall of 2004, then in the winter, spring, and summer of 2005. Selected forbs and shrubs were analyzed for crude protein and acid detergent fiber in June 2005. One growing season after treatment, commonly browsed deer forage plants were increased by March disking (273%), October disking (260%), and March burning (149%) when compared to control. Two growing seasons after treatment, no differences were detected among treatments for selected deer forages. March disking, October disking, and March burning increased vertical structure during the dormant season, providing additional cover for deer. Crude protein (16.2-36.6) and acid detergent fiber levels (16.7-36.5) were good to excellent for all forages tested. We recommend disking and prescribed fire to increase deer forage potential and enhance suitable cover in nwsg fields. We do not recommend maintaining old-fields by mowing as bushhogging treatments were similar to controls for all parameters tested. Management practices should be distributed in time and space such that some portion of the field is disturbed each year as our results indicate beneficial response of deer forage plants may be short lived.

NOTES:

Monday, 2:30 – 2:50 p.m.

Movements of Exurban White-tailed Does During a Controlled Hunt, Revisited

Craig L. Rhoads, Jacob L. Bowman – University of Delaware; Brian Eyler – Maryland Department of Natural Resources

White-tailed deer have adapted to and thrive in highly fragmented exurban habitats. Little is known about deer responses to controlled hunts, one of the most common methods used for exurban deer population control. Our study investigated responses to controlled hunts of an exurban deer population residing on Fair Hill Natural Resource Management Area in Cecil County, Maryland. During the 2005 and 2006 controlled hunts, we collected 1,161 locations on 74 collared does (2005: n = 38, 2006: n = 36) and calculated 1,002 movement distances. Movement rates were greater (P = 0.017) during (444.1m) the controlled hunt than either before (361.6m) or after (345.1m). Period (before, during, after) and location (refuge, non-refuge) interacted (P = 0.008) to affect overall movement rates, with movement rates from non-refuge areas during the hunt being greatest (560.1m). On-stand movements (defined as movements occurring while hunters were on-stand) were greatest (P = 0.027) during the hunt (425.2m). Non-refuge movements (408.9m and 456.4m) were greater (P < 0.001) than refuge movements (261.2m and 307.4m) during both on-stand and off-stand time periods, respectively. The percentage of deer available for harvest decreased from before (2005 = 75.0%, 2006 = 70.1%) to after the hunt (2005 = 50.9%, 2006 = 51.7%). We also documented 17 of 74 (23%) monitored deer leaving their established annual home ranges in response to hunting pressure, with distances ranging from 0.6 to 3.7 miles outside of established home range boundaries. Our findings suggest that deer exhibit behavioral changes which may have a negative impact on controlled hunt efficacy. Additionally, refuge areas may support a substantial portion of the hunted population, further decreasing controlled hunt efficacy.

NOTES:

Monday, 2:50 – 3:10 p.m. Break – Palm Room 1, 2

Technical Session III – Palm Room 3, 4, 5

Bob Beyer, Moderator

Monday, 3:10 – 3:20 p.m. Instructions and Door Prizes

3:20 – 3:40 p.m.

Evaluation of the Efficacy of Florida Key Deer Translocations

Israel D. Parker, Roel R. Lopez, Nova J. Silvy, Donald S. Davis, Dominique E. Watts – Texas A&M University; Philip A. Frank – USFWS National Key Deer Refuge

The endangered Florida Key deer (*Odocoileus virginianus clavium*) is endemic to the Lower Florida Keys. In recent years, habitat fragmentation and restricted dispersal have resulted in small, isolated local populations on some islands. Recovery biologists proposed the use of translocations to increase the island populations that had declined or remained low; however, the efficacy of Key deer translocations had yet to be evaluated. The objective of our study was to evaluate survival, ranges, reproduction, and dispersal of translocated deer. In a 3-year span (2003–2005), we translocated 39 adult/yearling deer to Sugarloaf (»19 km from trap site; 10 M, 14 F) and Cudjoe (»15 km from trap site; 6 M, 9 F) keys. Deer were kept in large, high-fenced holding pens (Sugarloaf = 7.7 ha, Cudjoe = 10.7 ha) on the destination islands for 3–6 months (i.e., "soft release"). We observed high survival (n = 4 mortalities, S = 0.89) for translocated deer. We found translocated deer had larger (P = 0.05) seasonal ranges than resident deer. We found no difference in 95% ranges (P = 0.063) or 50% core areas (P = 0.052) =4 month post-release versus 4–8 months post-release. However, first-week post-release dispersal distances were significantly (P < 0.01) dependent on time kept in pen. Only 2 translocated deer (5%, 2/39) left the destination islands by the end of the study. We believe that our data support the conclusion that soft-release translocations are an effective strategy for creating sustainable outer-island Key deer populations.

NOTES:

Monday, 3:40 – 4:00 p.m.

Evaluation of Infrared Trail Camera Surveys for Estimating White-tailed Deer Populations at Differing Densities

Aaron M. Foley, Charles A. DeYoung, Timothy E. Fulbright, David G. Hewitt – Caesar Kleberg Wildlife Research Institute; Don A. Draeger – Comanche Ranch

We evaluated infrared trail camera (ITC) population estimates for white-tailed deer (*Odocoileus virginianus*) at different densities. We conducted 12-day baited ITC surveys during February 2006 in 6, 200-acre enclosures of natural habitat with varying deer densities in south Texas. We compared the 12-day results to Lincoln-Petersen estimates (termed base counts) using marked deer seen on ITC surveys from September 2005-January 2006 at unbaited sites in the same enclosures. The methods of Jacobson et al. (1997) were used to calculate population estimates for 12-day surveys. We used 95% confidence intervals (CI) of base counts to judge 12-day estimates as similar (within the CI), low (below lower limit of CI), or high (above upper limit of CI). We used 4 cameras/enclosure (1/50 acres) and analyzed 2,093 photos for base counts and 1,566 for 12-day estimates. In the 3 enclosures with the lowest density, 12-day estimates produced 2 that were similar and 1 high, versus base counts. However, the 3 enclosures with the highest density all produced low estimates for the 12-day surveys. Versus base counts, fewer individual bucks were seen on low 12-day estimates, about the same on similar estimates, and more on the high estimate. Across all densities, does/buck ratios were lower for 12-day estimates (0.75, $P = 0.015$) versus base counts (1.93), indicating that does were undercounted. Under the conditions of our study, 12-day baited ITC surveys were not long enough to produce accurate population estimates when deer densities were high.

NOTES:

Monday, 4:00 – 4:20 p.m.

Determining Detection Success and Density Estimations of White-tailed Deer Using Helicopter Transects: A King Ranch Example

Matthew J. Schnupp – Caesar Kleberg Wildlife Research Institute; Mickey W. Hellickson – King Ranch, Inc.; David G. Hewitt, Eric J. Redeker, William C. Stasey – Caesar Kleberg Wildlife Research Institute; Randy DeYoung

Helicopter surveys are regularly used as a tool to estimate white-tailed deer (*Odocoileus virginianus*) populations in South Texas. We compared density estimates obtained from flight surveys on the King Ranch between standard 100 yard swath width belt transects and estimates obtained using program DISTANCE. With a known number of GPS collard bucks (n=17) on our study area (10,000 ac.) we were able to test the visibility and detection rates using an R-44 (4-seat) helicopter and GPS technology. To determine the accuracy and importance of range finders in obtaining distance data for whitetail we compared known locations from GPS collard bucks to our rangefinder and visual estimation results. We anticipate the ability to calculate a range in detection rates, as well as an average detection rate that can be used to increase accuracy of future lease surveys. We present on the motivation, purpose, and data emerging from this study.

NOTES:

Monday, 4:20 – 4:40 p.m.

A Comparison of Hunter Knowledge and Satisfaction with QDM in Tennessee

Christopher E. Shaw, Craig A. Harper, Mark J. Fly – University of Tennessee

Hunter attitudes and characteristics influence quality deer management (QDM) programs. Few studies, however, have evaluated hunter knowledge and satisfaction levels associated with this management philosophy. We surveyed hunters on 4 clubs and 3 wildlife management areas (WMAs) with an antler restriction in Tennessee, as well as a random portion of sportsman license holders. Overall response rate was 54% (n=2,084), with rates ranging from 50% for sportsman license holders up to 73% for one club. When asked to rate their knowledge of QDM, most club hunters (81%), WMA hunters (76%), and sportsman license holders (75%) rated themselves as somewhat knowledgeable. Sportsman license holders (13%) were most likely to rate themselves as not at all knowledgeable when compared to club (2%) and WMA (11%) hunters. When asked how old a buck should be before eligible for harvest in a QDM program, a majority of club hunters (69%), sportsman license holders (55%) and WMA hunters (56%) thought 3 ½ years. Most club hunters (66%) thought a gross antler score restriction was best for a QDM program, while most WMA hunters (59%) and sportsman license holders (50%) supported an antler point restriction. Sportsman license holders (24%) were most likely to feel the restriction should depend on the average characteristics of bucks in that area when compared to club (19%) and WMA (17%) hunters. Most club hunters (73%), WMA hunters (58%), and sportsman license holders (64%) supported a statewide antler restriction. Although most hunters preferred to shoot antlered bucks, sportsman license holders were more likely (10%) to prefer shooting does than club (5%) or WMA (5%) hunters. Most respondents (87%) from clubs and WMAs felt the QDM restrictions were working toward their goal. A majority of all respondents (78%) preferred to hunt areas under QDM restrictions; however, club members were more likely (91%) to prefer hunting these areas than sportsman license holders (76%) or WMA hunters (77%).

NOTES:

Monday, 4:40 – 5:00 p.m.

Comparing Attitudes of Residents and Nonresidents Toward White-tailed Deer Management in Canaan Valley, WV

Kelley L. Flaherty, James T. Anderson – West Virginia University

Canaan Valley, West Virginia is home to the largest high-elevation freshwater wetland complex east of the Rocky Mountains. Its' outdoor attractions make it a popular vacation and retirement location. The local white-tailed deer (*Odocoileus virginianus*) are a popular attraction for visitors as well as resident and nonresident hunters. However, there are concerns over the impact of white-tailed deer herbivory on rare plants and rare plant communities in the wetlands. The purpose of this study was to evaluate the attitudes of residents and non-residents with respect to white-tailed deer management and rare plant conservation. We mailed surveys to randomly selected property owners in Canaan Valley and Tucker County, WV. We also made surveys available to visitors at Canaan Valley State Park and Canaan Valley National Wildlife Refuge. Surveys included 25 questions that measured stakeholder responses using the Likert scale. A higher percentage of nonresidents (78%) than residents (57%) believed that there was an overabundance of deer in Canaan Valley ($n = 122$, $p = 0.0128$). When compared with residents (58%), nonresidents (89%) were also more likely to agree that rare plants should be protected from the impacts of deer browse ($n = 112$, $p = 0.0001$). A higher percentage of residents (75%) than nonresidents (52%) were hunters ($n = 156$, $p = 0.0033$). While differences in opinions did differ significantly for many management issues, the majority of residents tended to agree with nonresidents. A strong dichotomy in opinions on management may not be the reality in Canaan Valley.

NOTES:

Monday, 5:00 Dinner on Your Own

7:00 Shoot From the Hip Session— Atrium

Tuesday, February 27, 2007

Technical Session IV – Palm Room 3, 4, 5

Nelson LaFon, Moderator

8:00 – 8:10 a.m. Instructions and Door Prizes

8:10 – 8:30 a.m.

Behavioral Responses of White-tailed Deer to Vehicle-mounted Sound-producing Devices

Sharon A. Valitzski, Gino J. D'Angelo – University of Georgia; George R. Gallagher – Berry College; David A. Osborn, Karl V. Miller, Robert J. Warren – University of Georgia

We evaluated the efficacy of sound as a deterrent for reducing deer-vehicle collisions by observing the behavioral response of captive and free-ranging white-tailed deer (*Odocoileus virginianus*) to 5 pure-tone sound treatments: 0.28 kHz, 1 kHz, 8 kHz, 15 kHz, and 28 kHz. We conducted preliminary trials with semi-tame deer at the University of Georgia Captive Deer Research Facility. We exposed 8 deer in a 0.25-acre outside paddock and 5 deer in individual stalls (9 ft x 12 ft) to the various treatments at >70 dB Sound Pressure Level. We recorded 406 observations and determined that the behavior of captive deer did not change when presented with any of the 5 pure-tone sound treatments. We also conducted field trials at Berry College Wildlife Refuge, Georgia and gathered 319 behavioral observations of free-ranging deer relative to a moving automobile (35 mph). The automobile was fitted with a sound-producing device and speakers that emitted one of the pure-tone sound treatments or no sound treatment as a control. For the 1 kHz, 8 kHz, 15 kHz, and 28 kHz sound treatments, we observed no change in deer behavior relative to the control. When exposed to the 0.28 kHz treatment, deer reacted in a manner more likely to cause deer-vehicle collisions. Our results indicate that deer within 10 yards of roadways did not alter their behavior in response to the pure-tone sound treatments we tested in a manner that would prevent deer-vehicle collisions. Commercially available wildlife warning whistles (aka deer whistles) are purported to emit similar consistent, continuous sounds as pure tones at various frequencies within the range of those presented in this study. Our data suggests that deer-whistles, as they are purported to operate, are likely not effective in preventing deer-vehicle collisions.

NOTES:

Tuesday, 8:30 – 8:50 a.m.

Deer Density and Deer/Vehicle Collisions in a Rural County in Virginia

William J. McShea, Chad M. Stewart, Laura J. Kearns, Stefano Liccioli – Smithsonian National Zoological Park

Collisions with white-tailed deer are a safety and economic hazard to motorists. Many efforts to reduce deer/vehicle collisions have proved unsuccessful, but focus has been on deer reduction as the primary tool. The Virginia Department of Transportation geolocated all deer/vehicle collisions in Clarke County, Virginia, between August and December of 2005 (n=246) and again in 2006. We estimated hunting pressure, deer density, amount of forest and housing development, presence of crops and corridors, and road metrics for 228 road segments (each 250 m in length) within the county, to determine which factors are correlated with deer/vehicle collisions. Logistic regression of 2005 data indicated deer density (range 10-35 deer/km^2) was either a non-significant factor or that deer/vehicle collisions were lower in areas of higher deer density. This was true for both primary and secondary roads, and for both the entire period and the peak of rut (October 1- November 30). Road attributes (speed limit and volume), along with the amount of forest cover, were important attributes of road segments when predicting deer/vehicle collisions. Hunting pressure was also not a significant variable in our model, suggesting that the harvest rates in Clarke County (range 3.0- 18.0 deer/km^2) are not high enough to effectively limit collisions. Over the range of deer densities and harvest levels found in a typical Virginia county there is little evidence that increased deer harvest reduced deer/vehicle collisions.

NOTES:

Tuesday, 8:50 – 9:10 a.m.

Fine-scale Movement and Activity of Adult Male White-tailed Deer in an Agricultural Landscape

James W. Tomberlin, Richard A. Lancia – North Carolina State University; Mark C. Conner – Chesapeake Farms

Knowledge of adult male white-tailed deer (*Odocoileus virginianus*) movement and activity from August through December is important in understanding breeding ecology and evaluating constraints on management strategies. Hence, we fitted 15 adult males with GPS radiotelemetry collars at Chesapeake Farms on the Eastern Shore of Maryland. We delineated 4 seasons (pre-rut1, pre-rut2, rut, and post-rut) based on fawn capture and parturition data at Chesapeake Farms. Ninety-five percent (home range) and 50% (core area) utilization distributions were estimated using the adaptive kernel method. Intensity of range use was calculated as the ratio of core area to home range. Mean home range was 896 ac with no significant difference detected among seasons ($p=0.27$). Mean core area was 115 ac with the rut (156 ac) being significantly larger ($p=0.046$) than late summer (35 ac). Intensity of use by season ranged from 10.8% during early winter to 16.9% during pre-rut, with a mean of 13.7%. Average daily movement during the rut (2.5 miles $\pm$ 1.5 miles, $p<0.0001$) was significantly higher than during any other season. Relative activity during the rut was significantly higher than during pre-rut1 ($p=0.01$). Cultivated vegetation was the predominant cover type used during August and September with woodlands more selected through December. Crop phenology influenced movement in addition to breeding. Behavior of adult males will vary across the landscape with the onset of the rut and seasonal changes in habitat availability. Understanding this behavior is essential in understanding limitations of harvest strategies.

NOTES:

Tuesday, 9:10 – 9:30 a.m.

Spatial Ecology of Exurban White-tailed Deer

Craig L. Rhoads, Jacob L. Bowman – University of Delaware; Brian Eyler – Maryland Department of Natural Resources

Many studies have investigated white-tailed deer ecology, with most focused on rural or urban deer populations. In recent years, exurban expansion has produced a new habitat in which deer are thriving. To address increasing deer populations, managers must understand how deer utilize exurban landscapes. From June 2004 – January 2006, we collected 38,578 telemetry and visual locations on 66 collared does to investigate seasonal home range sizes, home range fidelity, and hourly movement rates. Average adaptive kernel home range sizes ranged from 8.1 – 21.7 hectares (20.0 - 53.6 acres) and 70.9 – 144.5 hectares (175.2 – 357.1 acres) among seasons at the 50% and 95% spatial scales, respectively. Average home range sizes followed a general increasing trend from the fawning through post-hunting season. Seasonal home range overlap differed by season at the 50% and 95% spatial scales, with the least overlap ($P < 0.001$) occurring between the post-hunting and fawning seasons (50% = 19.4%, 95% = 33.3%). Circadian activity rates varied among seasons, with dusk movements being greatest in all seasons. Average diurnal activity was greatest during the middle (1 Oct – 30 Nov; 65.7 m/hr) and late (1 Dec – 31 Jan; 67.8 m/hr) seasons and least during the post-hunting (1 Feb – 30 Apr; 46.2 m/hr) season. Our findings indicate that most deer remain on similar ranges throughout potential hunting seasons, and that dusk activity peaks provide the greatest potential for deer/hunter contact harvest opportunities.

NOTES:

Tuesday, 9:30 – 9:50 a.m.

Habitat Use of Sika and White-tailed Deer on Assateague Island National Seashore, Maryland

Sonja A. Christensen, Duane R. Diefenbach – USGS Pennsylvania Cooperative Fish and Wildlife Research Unit; Mark Sturm – NPS Assateague Island National Seashore

Deer herbivory from native white-tailed deer (*Odocoileus virginianus*) and exotic sika deer (*Cervus nippon*) is affecting vegetative communities on Assateague Island, including endangered plant species. However, little information exists regarding the ecology and habitat use of sika and white-tailed deer on this island. To better understand these two species, a radio-telemetry study is in progress which seeks to monitor population characteristics and habitat use for each species. We radio-collared 23 sika deer and 7 white-tailed deer throughout the island and estimated habitat use on a seasonal basis. Data collection occurred during May–June 2006, and August–September 2006, which corresponded with the early and late vegetative growth periods, respectively. During May–June 2006, we collected 742 locations; 564 were of sika deer and 178 were of white-tailed deer. Sika deer were located in the following habitats: sand (2.3%), developed (3.6%), grassland (10.5%), herbaceous/saltmarsh (15.6%), forest (20.6%), and shrubland (47.5%). White-tailed deer were located in sand (1.12%), grassland (9.0%), herbaceous/saltmarsh (16.9%), forest (33.2%), and shrubland (39.9%). Deer survival was 100% between the capture period (January – March 2006) and hunting season (September 2006). Habitat use was similar between the two species, although white-tailed deer used more forested habitat, which indicates potential for competitive interaction between species. Ultimately, we hope to develop models of habitat use to provide resource managers with information to develop an adaptive management program to manage ungulate herbivory of island plant communities.

NOTES:

Tuesday, 9:50 – 10:10 a.m. Break – Palm Room 1, 2

Technical Session V – Palm Room 3, 4, 5

Greg Moore, Moderator

Tuesday, 10:10 – 10:20 a.m. Instructions and Door Prizes

10:20 – 10:40 a.m.

White-tailed Deer Use of Selected Forage Plantings Across Varying Deer Densities in Tennessee

John P. Gruchy, Christopher E. Shaw, Craig A. Harper – University of Tennessee

Supplemental food plots may provide large amounts of high quality forage during periods of nutritional stress for white-tailed deer. We measured standing crop, nutritional quality, and white-tailed deer use of 5 perennial, 8 cool-season annual, and 6 warm-season annual forages on 3 demonstration sites with different deer densities in Tennessee, 2004 – 2006. Forage use differed among sites. With the exception of annual ryegrass and orchardgrass all forages provided adequate crude protein (CP > 16%) and were highly digestible (acid detergent fiber < 40%) during vegetative growth. Soybeans were used heavily (> 80% consumed) across all deer densities. Chicory, ladino clover, crimson clover, wheat, oats, berseem clover, lablab, re-seeding soybeans, and American jointvetch received moderate use (> 15 % consumed) at a low deer density (20 – 30 deer/mi^2), but were used extensively at medium (50 – 60 deer/mi^2) and high (>90 deer/mi^2) deer densities. Deer use of red clover, alfalfa, arrowleaf clover, Austrian winter peas, dwarf essex rape, iron-clay cowpeas, and alyceclover was low (≤ 15% consumed) at a low deer density, but increased as deer density increased. Annual ryegrass and orchardgrass were used sparingly (< 10% consumed) across all deer densities. When selecting forage plantings for white-tailed deer, managers should choose species or blends that are adapted for their soil types and climate, provide high-quality forage during stress periods, and are readily consumed by deer.

NOTES:

Tuesday, 10:40 – 11:00 a.m.

Production and White-tailed Deer Selection of Naturally Occurring Forages Following Burning and Fertilization

Christopher E. Shaw, Craig A. Harper – University of Tennessee; Michael Black – ATA Conservation; Allan E. Houston – University of Tennessee

Prescribed burning and fertilization are often promoted to improve forage availability and palatability for white-tailed deer. We implemented prescribed fire, understory fertilization, and prescribed fire with understory fertilization with controls in two closed-canopied hardwood stands in Tennessee and measured leaf biomass (lbs/acre) and selection of naturally occurring forages by white-tailed deer pre- and post-treatment. At one site (Rocky River), woody leaf biomass increased (109 to 196 and 91 to 232 lbs/acre, respectively) following prescribed fire and prescribed fire with understory fertilization. Woody leaf biomass did not change (136 to 106 and 59 to 71 lbs/acre, respectively) following fertilization only or in control plots. During the pre-treatment summer, deer selected greenbrier, blackgum, and blackberry at this site. Herbaceous biomass increased across all plots during the post-treatment year; however, there was no increase as a result from any treatment. At Ames Plantation, there was no difference in woody leaf biomass between pre-treatment and post-treatment years (153 to 165 lbs/acre). Greenbrier, supplejack, blackgum, rose, and winged elm were selected at this site. Herbaceous biomass increased following prescribed fire and prescribed fire with understory fertilization (7 to 16 and 1 to 49 lbs/acre, respectively). Although statistical increases in forage availability were measured at both sites, we do not believe these increases are biologically significant, especially when compared to increases following stand disturbance. To increase available nutrition for white-tailed deer, we recommend landowners consider thinning and timber harvest operations as well as quality forage food plots.

NOTES:

Tuesday, 11:00 – 11:20 a.m.

Temporal Distribution of Breeding Success in White-tailed deer: Does Male Social Dominance Fail During the Peak of the Rut?

Jason A. Sumners – Texas A&M University; Randy W. DeYoung – Caesar Kleberg Wildlife Research Institute; Rodney L. Honeycutt – Pepperdine University; Stephen Demarais – Mississippi State University; Mickey W. Hellickson – King Ranch, Inc.; Ken L. Gee, Robert A. Gonzales – Samuel Roberts Noble Foundation

The breeding structure of white-tailed deer has been described as dominance based. In age-structured populations relatively few dominant males were thought to do most of the breeding. However, recent studies have documented the successful breeding of all age classes. We sampled litters of offspring from the King Ranch in south Texas from 2000 thru 2006. Seventeen microsatellite loci were used to assign genetic paternity to 70 litters, with estimated conception dates. Mature males successfully sired 65% (45/70) of all litters, while yearling males (1.5 yrs old) sired 14% (10/70) and 2.5 year old males sired 21% (15/70). The average date of peak breeding (December 7th) did not differ between age classes. Although breeding success was distributed evenly throughout the season for 2.5 year old and mature males, successful breeding for yearling males was restricted to the period of peak breeding activity. This suggests that during the early part of the breeding season mature males are able to assert their social dominance. But as the rut begins to peak, and more does become receptive, mature males are no longer able to control the breeding rights to females allowing for immature bucks to successfully breed.

NOTES:

Tuesday, 11:20 – 11:40 a.m.

Movement Patterns of Male White-tailed Deer Suggest that Juvenile Breeding Effort is Suppressed by Mature Males

Robert W. Holtfreter, Stephen S. Ditchkoff – Auburn University; Ronald E. Masters – Tall Timbers Research Station; Edgar R. Welch – Red Rock Ranch; William R. Starry – McAlester Army Ammunition Plant

Age-class structure is a critical factor for management of white-tailed deer (*Odocoileus virginianus*). It has been hypothesized, that when present, mature males suppress breeding efforts of juvenile males, with net positive effects on juvenile condition and antler development in succeeding years. We examined 24-hour movement patterns (~ 8 locations/animal/24-hour period) of radio-collared male white-tailed deer (n = 52) during the breeding season, from 1995-1997, at McAlester Army Ammunition Plant (McAAP) in Oklahoma. Linear movements increased 47.8% throughout the breeding season (Oct. 1st- Dec. 15th) for juvenile males (1.5-2.5 years old), but decreased 34.5% for adult (3.5-4.5 year olds) and 30.8% for mature males (≥5.5 years old). During this period, maximum distance traveled increased 71.1% for adult males, and 58.7% for mature males, while increasing only 26.8% for juvenile males. Near the end of the breeding season (Nov. 26th- Dec. 15th), movement rates were greater for adult (= 807 ft/hr) and mature (= 754 ft/hr) males than for juveniles (= 603 ft/hr). Distance between extremes for juveniles (= 3,484 ft), near the end of the breeding season, was greater than for adults (= 2,680 ft) and mature males (= 2,598 ft). Throughout the breeding season, older males increasingly covered more ground at a faster rate than juvenile males; however, juvenile males moved in a more linear fashion and subsequently covered greater straight-line distances. Assuming females are not randomly distributed on the landscape, the highly active, circular movements of older males are a response to the presence of females in predictable locations. In contrast, slow, linear movements of juvenile males are likely a function of the presence of older males limiting access to females.

NOTES:

Tuesday, 11:40 – 12:00 p.m.

High Rates of Multiple Paternity in Diverse Populations of White-tailed Deer: Evidence for Active Solicitation of Matings by Females?

Randy W. DeYoung – Caesar Kleberg Wildlife Research Institute; Steve Demarais – Mississippi State University; Mickey W. Hellickson – King Ranch, Inc.; Kenneth L. Gee – Samuel Roberts Noble Foundation; Jason A. Sumners – Texas A&M University; Rodney L. Honeycutt – Pepperdine University; Robert A. Gonzales – Samuel Roberts Noble Foundation

Several recent studies have documented unexpected patterns of mating in white-tailed deer, including evidence for multiple paternity (siring of offspring by >1 male) in single litters. However, why and how often multiple mating occurs in free-ranging deer is unknown. We sampled litters of offspring from 2 populations of white-tailed deer that differ in demographic parameters as a result of harvest management: a public hunting area in Mississippi (N = 30 litters, 1:7 M:F, 19% of males ³ 3.5 years) and a private ranch in Texas (N = 51 litters, 1:2.5 M:F, 58% of males ³ 3.5 years). Likelihood ratio tests of relationship (e.g., full vs. half siblings) within litters based on genetic data revealed high rates of multiple paternity in both the public (6/30 litters, 20%) and privately managed populations (12/51 litters, 23.5%). There were no temporal trends in conception dates among multiple-sire litters vs. single-sire litters within populations. Finally, we tested for multiple paternity in 4 additional populations in Mississippi and Oklahoma to determine if multiple mating was isolated or common; we found evidence for multiple paternity in 10/41 litters (24.4%). Multiple mating appears to be a common occurrence in white-tailed deer, appearing in all 6 populations we examined. The lack of association between population demographic parameters or conception date suggests that male-male competition for breeding is not the most important factor in multiple mating. Females may solicit or allow matings from >1 male, either as a "bet-hedging" strategy or to increase offspring fitness since adult does commonly produce twin offspring.

NOTES:

Tuesday, 12:00 – 1:00 p.m. Lunch on Your Own

Technical Session VI – Palm Room 3, 4, 5

Jake Bowman, Moderator

Tuesday, 1:00 – 1:10 p.m. Instructions and Door Prizes

1:10 – 1:30 p.m.

Density Dependence in Deer Populations: Relevance for Management in Poor Quality and Variable Habitats

Charles A. DeYoung – Caesar Kleberg Wildlife Research Institute; D. Lynn Drawe – Rob and Bessie Welder Wildlife Foundation; Timothy E. Fulbright, David G. Hewitt – Caesar Kleberg Wildlife Research Institute; Stuart W. Stedman – Wesley West Interests, Inc.; David R. Synatzske – Texas Parks and Wildlife Department; James G. Teer – Rob and Bessie Welder Wildlife Foundation

New World deer of genus *Odocoileus* are commonly assumed to respond to food shortage due to intraspecific competition by reduced recruitment, body mass, and other manifestations. This has been termed density dependence and deer harvest management is theoretically based on this concept. However, some researchers have questioned whether density dependence is operative in poor quality or variable habitats. We analyzed for density dependence in 3 times series of deer counts (21, 29, and 33 years) from south Texas, which has highly variable rainfall. On the westernmost (driest) study area, no density dependence was detected ($P > 0.05$). Modest indications of density dependence were detected in the center of the region ($P = 0.03$), whereas to the east near the Gulf of Mexico (wettest area), strong density dependence ($P = 0.0001$) was suggested. We propose that most populations undergo periods of density dependence and density independence, with the likelihood of density dependent periods less in poor quality and variable environments. We include in variable environments those with variable precipitation and/or periodic severe winters. Using literature and hypothetical values, we produced a map of the lower 48 states of the USA showing areas where density dependent behavior in deer populations may not be common. Such areas covered 59% of deer range in the lower 48 states. For deer populations, we believe that density dependence and harvest theory derived therefrom are useful theoretical concepts. However, we urge deer managers to use caution in applying these concepts to practical population management.

NOTES:

Tuesday, 1:30 – 1:50 p.m.

Evaluation of the Cementum Annuli Aging Technique Using South Texas White-tailed Deer

Mickey W. Hellickson – King Ranch, Inc. and Caesar Kleberg Wildlife Research Institute; David G. Hewitt, Fred C. Bryant, John S. Lewis – Caesar Kleberg Wildlife Research Institute

The ability to accurately age deer is essential for management and research purposes. Our objectives are to: (1) obtain a large sample of known-age incisor teeth to test the accuracy of the cementum annuli technique; and (2) to refine this technique where inaccuracies are found. Study sites include 4 areas in Webb County, 1 in Brooks County, and 1 in Kleberg County, Texas. A blind test of the cementum annuli technique using 2 experienced observers and involving 234 known-age I1-I3 incisors from 116 wild deer ≥2 years old indicated an overall accuracy of 61%, while 93% were aged ±1 year of actual age. Aging accuracy decreased as incisor age increased and was 71, 65, 56, 48, 46, 65, and 61% for 2-, 3-, 4-, 5-, 6-, 7-, and ≥8-year-old incisors, respectively. Aging accuracy for young (2-3 years old), middle-aged (4-5 years old), and mature (≥6 years old) deer was 68, 53, and 56%, respectively. Aging accuracy by observer was similar (60 versus 62%). Observers assigned different ages to 38% of incisors. Inaccurate estimates tended to be underaged (66%). No differences in accuracy were found comparing supplementally-fed sites (60% accuracy) to non-supplementally-fed sites (64%). Aging accuracy was higher for middle-aged (53% versus 37%) and mature (56% versus 25%) deer using the cementum annuli technique versus the Severinghaus tooth replacement and wear technique. We recommend the Severinghaus technique for young (0-2 years old) deer and the cementum annuli technique for middle-aged and older (≥3 years old) deer.

NOTES:

Tuesday, 1:50 – 2:10 p.m.

Modeling License-buying Behavior and Evaluating Strategies to Increase Hunter Participation

David P. Scott, Michael J. Tonkovich – Ohio Department of Natural Resources

Wildlife agencies are faced with declining hunter numbers and license sales. In Ohio, license sales declined 22% from 1989-1999; thus, our strategic plan identifies recruitment and retention of hunters as a priority issue. We addressed this issue by developing models to predict the likelihood of participation in hunting by past license buyers. We applied several promotional treatments to select groups of hunters to evaluate their effectiveness for increasing license sales. Control groups were used to evaluate how well models predicted license-buying behavior among groups and to estimate effect size for each promotional strategy tested. Major predictive variables in models included patterns of license or permit buying during the previous 4 years and timing of those purchases with respect to the beginning of Ohio's deer firearms season in late November. We assigned probability of future participation scores to over 300,000 individuals. In 2004, a promotional brochure emphasizing deer hunting opportunities was sent in mid-October to past license buyers with predicted low (p=0.27; n=20,000) and moderate (p=0.52; n=10,000) probabilities of continued participation. A small incentive offer was included in the brochures sent to half of the low probability group. In 2005, 3 different postcards were developed to emphasize archery, upland game, and deer firearms season opportunities. Postcards were mailed in September, October and mid-November to 30,000 past deer permit buyers. Targeted groups included those identified in 2004 with low (n=10,000) and moderate (n=10,000) probabilities of continued participation as well as avid hunters (p=0.78; n=10,000) who participated every year, 2000-2003, but not in 2004. Results will include an evaluation of model performance compared to license-buying behavior of individuals in control groups (2004 range: -3.1-2.2%), effect size for promotional treatments (2004 range: 0.75-1.31%), license sales among groups based on timing of mailings, and an economic analysis of the cost of treatments versus expected revenues.

NOTES:

Tuesday, 2:10 – 2:30 p.m.

Effect of Antler Point Restrictions on Buck Survival in Pennsylvania

Bret D. Wallingford – Pennsylvania Game Commission; Duane R. Diefenbach – USGS Pennsylvania Cooperative Fish and Wildlife Research Unit; Christopher S. Rosenberry – Pennsylvania Game Commission; Eric S. Long – USGS Pennsylvania Cooperative Fish and Wildlife Research Unit

Little research has measured the effect of antler point restrictions (APRs) on buck harvest rates and survival. Consequently, it is unknown whether hunter support for APRs is because of real or perceived changes in the deer population. Pennsylvania implemented APRs in 2002, with a legal buck for harvest needing ³3 or ³4 points on one side, depending on the unit. We captured and radio-marked 442 juvenile males (6-9 months old) and 101 adult males (>18 months old) from December 2001-April 2004 and monitored them monthly through January 2006 on two study areas. We also conducted hunter attitude surveys to monitor hunter support for APRs. We found survival differed by age and varied by month of year, but we detected no difference between study areas or among years. For yearlings, the annual survival rate was 0.47 (SE = 0.03), and the harvest rate was 0.31 (SE = 0.04). Annual survival rate, harvest rate, and probability of surviving to the next hunting season for adults was 0.28 (SE = 0.03), 0.59 (SE = 0.08), and 0.92 (SE=0.02), respectively. Hunter support for antler restrictions changed little from before APRs (57%) to 3 years after APRs (56%). We conclude that APRs in Pennsylvania reduced the harvest rate of yearling and adult bucks, most bucks that survived the hunting season were available for harvest the following year, the number of adult males in the population increased, and hunter support for APRs remained stable.

NOTES:

Tuesday, 2:30 – 2:50 p.m.

Bioassay for CWD Prions in Saliva, Blood or Excreta of Deer

Candace K. Mathiason – Colorado State University; Jenny Powers – NPS Biological Resource Management Division; Sallie Dahmes – Wildlife Artist Supply Company; David A. Osborn, Karl V. Miller, Robert J. Warren – University of Georgia; Gary Mason, Sheila Hays, Jeanette Hayes-Klug, Davis Seelig – Colorado State University; Margaret Wild – NPS Biological Resource Management Division; Lisa Wolfe – Colorado Division of Wildlife; Terry Spraker – Colorado State University; Michael Miller – Colorado Division of Wildlife; Christina Sigurdson – Colorado State University; Glenn Telling – University of Kentucky; Edward Hoover – Colorado State University

A critical concern in the transmission of prion diseases, including chronic wasting disease (CWD)—a transmissible spongiform encephalopathy (TSE) of cervids—is the potential presence of prions in body fluids. To address this issue directly, we exposed cohorts of CWD-naïve, hand-raised deer to saliva, blood, or urine and feces from CWD-positive deer. The recipient animals were monitored for CWD infection under rigorous indoor isolation conditions to exclude potential adventitious prion exposure. We report the presence of infectious prions capable of transmitting CWD in saliva (by the oral route) and in blood (by transfusion). To our surprise, we were not able to detect transmission of infectious CWD in naïve recipient deer fed urine and feces from CWD-positive donors, despite multiple exposures. The presence of infectious prions in saliva helps to explain the efficient transmission of CWD in nature, while the presence of infectious prions in the blood of CWD+ deer establishes a basis for developing antemortem detection of the disease by blood-based assay methods.

NOTES:

Tuesday, 2:50 – 3:10 p.m. Break – Palm Room 1, 2

Technical Session VII – Palm Room 3, 4, 5

Mark Conner, Moderator

Tuesday, 3:10 – 3:20 p.m. Instructions and Door Prizes

3:20 – 3:40 p.m.

The Sun Doesn't Always Shine on Your Favorite Paradigm: The Influence of Density-independent Factors

Bronson K. Strickland, Stephen Demarais – Mississippi State University

Many biologists in the southeastern U.S. manage white-tailed deer populations based on a density-dependent paradigm; whereby, biologists monitor annual changes in physiological indices (e.g., body weight, condition, etc.) of a deer herd and make harvest prescriptions to decrease, increase, or maintain deer density. However, environmental events may also influence these physiological indices, and cause biologists to make the wrong management recommendations. We analyzed 12-16 year time series of 3 harvested white-tailed deer populations in Mississippi to determine the relative influence of density-dependent and -independent effects on body weight and reproduction of deer cohorts. Using simple and multiple linear regression we related a recruitment index, body weight of 0.5-, 1.5-, 2.5-, and ^{3}3.5-year female cohort body weight, and 2.5- and ^{3}3.5-year % lactation of cohorts to variables representing deer harvest, spring and summer precipitation, spring and summer temperatures, high-quality agronomic plantings, and flooding events. Variation in body weight and % lactation was primarily explained by density-independent effects of temperature, precipitation, and agronomic plantings in 1 population; whereas, both density-dependent and -independent variables were important in 2 populations. Although to a lesser degree than deer populations exposed to severe winters in more northern latitudes, the dynamics of white-tailed deer populations in the southeastern U.S. are affected by random climatic events. Biologists must incorporate the effects of density-independent climatic events to fully understand annual variation in condition and reproduction of white-tailed deer cohorts in the southeastern U.S.

NOTES:

Tuesday, 3:40 – 4:00 p.m.

Assessing the Helicopter and Net-gun as a Capture Technique for White-tailed Deer

John S. Lewis – Caesar Kleberg Wildlife Research Institute; Stephen L. Webb – Mississippi State University; David G. Hewitt – Caesar Kleberg Wildlife Research Institute; Mickey W. Hellickson – King Ranch, Inc.

Net-gunning is a technique used to capture white-tailed deer that is useful in a variety of habitat types, at various population densities, and has the ability to be highly selective. Deer may sustain injuries or even die as a result of capture and handling, and may also be prone to capture myopathy. It is difficult to determine rates of mortality due to myopathy unless deer are intensively tracked or monitored with radio telemetry equipment. Our objectives were to: 1) determine frequency and type of injuries sustained during the helicopter and net-gun capture and 2) determine the effects of capture on survival of radio-collared deer. Our study was conducted on 5 ranches in southern Texas. We captured 3,350 white-tailed deer from 1998-2005 using a net-gun fired from a helicopter. Additionally, we captured 51 yearling bucks during 1998 and 1999 and fitted them with radio-collars to document mortality after capture. We captured 49 mature (=4 years of age) bucks on the Callaghan Ranch over 2 years and monitored their survival. We noted injuries and mortalities during data collection and ranked the seriousness of injuries on a scale from 0-4. We reported 54 body injuries (1.6%), 20 direct mortalities (0.6%), and 164 antler injuries (4.9%). The majority of antler injuries were broken main beams and the majority of body injuries were broken legs. Data from radio-collared deer corroborated our findings that post-capture mortality rates were low for this capture method. Based on capture related mortalities, net gunning was found to be a relatively safe capture technique compared to other capture techniques, particularly when conditions are favorable.

NOTES:

Tuesday, 4:00 – 4:20 p.m.

Weather Affects on Activity Rates of Male White-tailed Deer in Southern Texas

Mickey W. Hellickson – King Ranch, Inc. and Caesar Kleberg Wildlife Research Institute; Karl V. Miller, R. Larry Marchinton – University of Georgia; Charles A. DeYoung, Cody Zabransky – Caesar Kleberg Wildlife Research Institute

Knowledge of how various weather parameters affect activity rates of male white-tailed deer are required for making informed management decisions. We combined radio-transmitting collars equipped with variable-pulse activity sensors with an automated telemetry system to quantify relative activity rates of 35 males in southern Texas during July 1993-October 1995. Males within 1.5 miles of the data collection unit were monitored for 3 to 28 months. We categorized (88-90% accuracy) each of 470,443 1-minute observations as inactive (i.e., bedded or standing) or active (i.e., walking, running, feeding, or grooming). Activity data were grouped and hourly means were calculated for comparison to weather data. Temperature, barometric pressure, and relative humidity data were remotely collected at 15-minute intervals using automated HOBO™ loggers. Rainfall and moon phase data were also compared to male activity rates. No correlation was found between hourly means in male activity and temperature (r = 0.384) or barometric pressure (r = 0.049). A negative, but non-significant correlation (r = -0.332) existed between male activity and relative humidity. No change in male activity rates occurred during a 0.85-inch rainfall event in November, but a 2-inch rain event in September corresponded to a 70% increase in male activity rates. No relationship between moon phase and either daytime or nighttime male activity rates were noted when comparing the lightest phase (full moon) to the darkest phase (new moon). We will also report additional comparisons between hourly means in male activity rates and extremes in temperature, barometric pressure, and relative humidity.

NOTES:

Tuesday, 4:20 – 4:40 p.m.

Habitat Utilization Patterns by White-tailed Deer in South Texas

Don A. Draeger, T. Dan Friedkin – Comanche Ranch; Shawn D. Vickers – Kiva Consulting; Charles A. DeYoung, David G. Hewitt, Ralph Bingham – Caesar Kleberg Wildlife Research Institute; Danny Friedkin Jr. – Comanche Ranch

We modeled white-tailed deer use of habitat on a south Texas ranch during 2003-2006. Our habitat utilization models were based on disappearance of pelleted deer feed from sites spaced every 175 acres over the 26,435-acre study area. Our assumption that feed use was correlated to deer use of the landscape was supported by a strong relation between deer density measured by annual helicopter surveys and feed use. Pellet consumption was recorded weekly at 300 feeder sites across the 29-month study period. Consumption levels at each feeder site were tallied and aggregated by season, then placed into PROGRAM MAPINFO and subjected to a natural neighbor analysis. The natural neighbor technique enables the creation of accurate surface models from data that is sparsely distributed or very linear in spatial distribution, this interpolation makes use of an area-weighting technique to determine a new value for every grid node. There was no apparent relation between deer utilization and soils or vegetation type. Patterns did exist between deer habitat utilization and rainfall, mechanical manipulation of woody vegetation, and topography (particularly drainages) within the study area. Habitat utilization patterns revealed in this study will guide managers to more efficient habitat manipulation and management of semi-arid landscapes similar to the one we studied.

NOTES:

Tuesday, 4:40 – 5:00 p.m.

Digital Photographic Analysis to Measure Deer Browsing of Ornamental Shrubs Treated with Commercial Deer Repellents

Jonathan S. Kays, Doug Tregoning – University of Maryland Cooperative Extension

Commercial deer repellents have become increasingly popular with residential homeowners as a means of keeping deer damage at tolerable levels. This study assessed the effectiveness of a variety of products on deer browsing under many field conditions using a unique digital analysis technique that provide a quantitative measure of deer browsing. Eight commercial repellents were tested during the winter months of 2000, 2001, and 2002 in Montgomery County, Maryland to determine their effectiveness at reducing deer browsing on Japanese yews, azaleas, and English yews. Sites for the trials included suburban locations with deer populations exceeding 100 deer per square mile. Each site contained 24 potted shrubs (1-3 gallons) spaced 12 feet apart and securely anchored to the ground with steel stakes driven through the root ball and pot. There were four shrubs per treatment with six total treatments per site (one control and five different repellents). A digital photograph of each plant was taken at the time of planting and about once a week afterward for the length of the study which ranged from 9-14 weeks. The photos were taken from a fixed location with a large white board behind the plant so that all plant material appeared as black pixels against the white background. An image software program was used to measure the amount of black pixels or vegetation, which provided a quantitative measure of deer browsing. Over the three year period, 49% of the control plant vegetation was browsed while the average loss of all repellent treatments was only 18%. An extension fact sheet with full results of this project is available at: http://www.agnr.umd.edu/MCE/Publications/PDFs/FS810-A.pdf

NOTES:

Tuesday, 5:00 p.m. Deer Committee Business Meeting – Barbados Room

6:30 p.m. Social and Banquet, Closing Remarks and Awards – Palm Ballroom

Appendix I
State Narratives

ALABAMA

Few areas of comparable size rival Alabama when one considers the diversity of plant and animal species found within the state. From the Gulf Coast to the Cumberland Plateau, numerous physiographic regions divide the state. The Fall Line extends as an arc from the northwestern corner, southeastward across Alabama. This line separates the Coastal Plain to the south from the older upland provinces of the north and northeast. Elevation ranges from sea level to 2,407 feet above sea level. Several major rivers and their tributaries dissect the state, further adding to the diversity of habitats within Alabama.

Historically, deer were abundant in Alabama until unrestricted hunting and changes in land use reduced their numbers to only a few thousand animals in a couple of isolated locations by the early 1900's. The Game and Fish Department began cooperative restocking of suitable habitat as early as 1925 and with growing public support, the Department accelerated restocking efforts through the 1960's. By 1970, the State's deer population had increased to approximately 750,000 animals. Today's preseason population is estimated at 1.75 million deer.

All 67 counties have huntable numbers of deer and an open deer season. South and south central Alabama support the highest concentrations of deer and currently command the highest deer hunting lease fees. All counties have a 71-day gun deer season, allowing the harvest of one antlered buck per day. Prior to the 1998-99 hunting season, most areas were limited to 10 or less days of either-sex hunting during the general gun deer season. Bucks made up 65-70% of the annual harvest during this time. Age structure of harvested bucks is typically young, with the average age being approximately 2 years old. For the 1998-99 deer season, either-sex opportunities were increased in most counties. Most of the southern half of the state had 15-30 days of either-sex hunting during the general gun season. During these either-sex seasons, hunters can take one antlerless deer, in addition to one antlered buck, per day. The number of either-sex days was further increased in many counties during the 1999-2000 season, with some counties having as many as 45 days of either-sex hunting during the general gun season. With the additional opportunities for doe harvest, the total deer harvest for the 1999-2000 season was more closely balanced between bucks (55%) and does (45%).

Alabama's Deer Management Assistance Program (DMP) has been a very popular program since it's inception in 1984. By allowing the use of antlerless tags to meet harvest quotas, the DMP has given many landowners and hunting clubs the opportunity to manage their properties for better quality deer that the normal hunting seasons and bag limits could not offer. The DMP has been very successful in Alabama, but the need still exists for other options for managing deer herds on properties not enrolled in the program. In response to the continued need and desire for more opportunities to harvest antlerless deer, the lengths of either-sex season in many counties were increased for the 2000-2001 hunting season. For the first time, all 67 counties had an either-sex season during the general gun season. The length of these seasons ranged from 3 days to 75 days (the entire gun deer season). The bag limit also was raised to two deer a day, only one of which could be antlered, with no season limit applying to antlered or antlerless deer. As a result of the liberalized either-sex seasons, hunters harvested more does (243,180) than bucks (235,520) during the 2000-01 hunting

season. These changes gave hunters in most of Alabama ample opportunity to harvest antlerless deer. This increase provides the framework many landowners, hunting clubs, etc. need to manage their properties as they wish, without having to enroll in the DMP. It is hoped this increase in either-sex hunting opportunities will help stabilize expanding deer herds and correct out of balance adult sex ratios found in many parts of the state. The liberal either-sex opportunities remain in place.

ARKANSAS

Arkansas is a very diverse state in terms of physical and biotic characteristics. In terms of topography, geographical substrate and dominant vegetation, the state is divided into two primary regions — the Interior-Highlands (Ozark and Ouachita Mountain Natural Divisions) and the Lowlands (West Gulf Coastal Plain, Mississippi Alluvial Plain and Crowley's Ridge Natural Divisions). General vegetation in the Ozarks, Ouachitas, West Gulf Coastal Plain, and Mississippi Alluvial Plain divisions is upland hardwood and bottomland hardwood, respectively. Crowley's Ridge is forested with upland and bottomland hardwood types. The state is still classed as rural with a total human population of less than 2.5 million. Eighty-nine percent of the total land base is privately owned.

Arkansas' deer herd declined drastically around the turn of the century, reaching a low of approximately 500 deer statewide in 1930. The Arkansas Game and Fish Commission began an aggressive deer restoration program in the 1920s, 1930s and 1940s, which included refuge establishment, trapping and restocking, strict enforcement of laws and regulations, and conservative bucks-only hunting seasons. These efforts resulted in a rapidly expanding deer herd. In 1950, the estimated deer herd was about 40,000. By 1972, the herd had grown to an estimated population of approximately 300,000 and today approaches 1,000,000. Legal harvest increased from 540 deer taken in 1939 to a record harvest of 194,687 in 1999.

Today, the herd is somewhat stable in some areas with slow growth continuing in other areas. Highest densities occur in the coastal plain region while the lowest occur in portions of the mountainous interior highlands. The highest percentage of trophy deer occurs in portions of the Delta region.

A five-year Strategic Deer Management Plan was approved in 1999. Deer management units and zones are used for statewide herd management. Broadly, management efforts are directed toward increasing the female harvest and reducing the harvest of young males to improve buck-doe ratios and to also improve the buck age structure. Female harvest is accomplished with a liberal doe bag limit and special bonus doe permits. To reduce the harvest of young bucks Arkansas implemented a statewide antler restriction in 1998. Legal bucks must have at least three points on at least one antler. During the 1997-98 deer season in the West Gulf Coastal Plain Region, 1.5, 2.5, and 3.5 year old bucks made up 44%, 30%, and 9% of the buck harvest. By the 2001-02 season, those percentages had changed to 13%, 44%, and 25%. Statewide, during the 1997-98 deer season, bucks, button bucks, and does made up 55%, 8%, and 37% of the total harvest. By the 2001-02 season, those percentages had changed to 40%, 10%, and 50% respectively. During the 2003-2004 season 65,204 (61%) bucks, 9,756 button bucks (9%), and 32,175 (30%) does were harvested. The statewide bag limit is 3 deer, no more than two of which may be bucks. Button bucks count toward the buck bag limit. Checking of deer in Arkansas is mandatory. Starting in 2001, a biological data collection initiative was implemented. Recently biological data collection is at or near 10% of total harvest.

DELAWARE

At 1,954 square miles, Delaware is the second smallest state in the United States (Texas has counties that are larger than all of Delaware). While Delaware may be small in area, it is very densely populated. In 2005, Delaware was the 6th most densely populated state at 432 people/square mile. Delaware is divided into 2 physiographic regions, the Piedmont and Coastal Plain. Excluding the developed areas, the landscape in Delaware consists primarily of agricultural lands interspersed with small woodlots. These combinations create a unique situation for managing white-tailed deer (*Odocoileus virginianus*).

During the first part of the 20th century, over hunting and habitat destruction eliminated many of the deer in Delaware. The population eventually rebounded without any restocking efforts, and the first season was held on January 1st, 2nd, and 3rd, 1954. A total of 505 deer were harvested during the 3 day either sex season, with the heaviest being a 225 pound 1 ½ year old buck. Unlike most states, Delaware has maintained an either sex deer season since its inception.

An aerial infrared survey in December 2005 indicated the statewide deer population was approximately 50,000 deer before the 2005/06 hunting season. Deer densities in the 17 deer management zones ranged from 18.8 to 145.4 deer/square mile of deer habitat. The median deer density was 60.5 deer/square mile of deer habitat. Currently, 14 of the 17 deer management zones are above the Division's population goal.

Throughout much of the state the deer population has exceeded the cultural carrying capacity so liberal bag limits and seasons have been established. To promote antlerless harvest, a Delaware hunter may harvest an unlimited number of antlerless deer and only 2 bucks. However, 1 of the bucks must have an outside spread = 15 inches. The current seasons are as follows: Archery – September 1st through January 31st; Muzzleloader – 8 days in October and 6 days in January; Shotgun – 8 days in November and 8 days in January. To increase the harvest of antlerless deer, every Friday, Saturday, and Monday in October, and 8 days in December are open to antlerless deer hunting with a shotgun. The Saturday before the opening of the November shotgun season is set aside for youth hunting only. During the 2005/06 season Delaware held its first handgun season in early January.

During the 2005/06 season Delaware hunters harvested 13,670 deer. This marked the second all-time harvest for the state (the previous season was #1). The increase in harvest is attributed to the addition of antlerless only days in October. Nearly 50% of the total deer harvest occurred during the 8 day November shotgun season. Since the 2001/02 season, at least 50% of the statewide harvest has been comprised of does, and the trend continued this past season (54.8%).

Recently, the Delaware Division of Fish and Wildlife went through some major personnel changes within its Game Section. As a result, 2 new positions were created, an overall Game Program Manager and a Game Mammal Biologist. Due to the additional staff, data collection and public outreach efforts have been increased. While Delaware is not part of the Southeast Section of The Wildlife Society, Delaware petitioned to become a member of the Southeast Deer Technical Committee and was accepted into the group in July 2006. Delaware is currently in the early stages of developing a Strategic White-tailed Deer Management Plan and the hope is to have this document completed in 2007. The purpose of this plan is to maintain a healthy deer population that meets the needs of the people, but is also inline with what the environment can support.

FLORIDA

Florida's topography, with the exception of coastal dunes and bluffs, is flat for a considerable distance inland from both the Atlantic and Gulf coasts. Hilly, rolling topography extends from the northwestern part of the state ranging southerly through the center of the peninsula and gradually diminishes in Highlands County near Avon Park.

Florida has 15 general vegetation types of which 13 are important to deer because of the amount and variety of deer food plants present. These types are grouped into major categories of vegetation considered important to deer: flatwoods (39.6%), pine-oak uplands (29.3%), swamps (8.6%), hammocks (6.7%), freshwater marshes (5.6%), prairies (5.2%), sand pine-scrub oak ridges (1.5%), and various mixtures of other types including tidal marshes (3.5%).

In the 1800s and early 1900s, hunting was a way of life to the pioneers as well as the Indians. The sale of hides made up much of their income. Fire hunting (with torches) was a common practice of taking animals in the early days. From the 1920s to 1930s, ranchers were losing large amounts of money due to the loss of cattle as a result of "Texas Cattle Fever." Pressure was placed on the legislature for a cattle fever tick eradication program, which included the slaughtering of deer because they were believed to be reservoirs for the disease. Between 1939 and 1941, an estimated 10,000 deer were killed. Possibly the most serious problem facing the white-tailed deer during this time in Florida history was the screw-worm. An acute increase in deer numbers was evident immediately following the eradication of the screw-worm fly by the U.S. Department of Agriculture.

Since the 1930s, Florida's white-tailed deer herd has increased dramatically as a direct result of enforcement of harvest restrictions and the screw-worm eradication. White-tailed deer harvest in Florida currently exceeds 100,000 animals annually, which is higher than estimates of the entire population during the early 1960s. Today, the Florida Fish and Wildlife Conservation Commission (FWC) allows either-sex archery hunting, has a lottery drawing for antlerless deer permits on many wildlife management areas (WMAs), issues antlerless deer permits on private lands, and has a seven days antlerless deer season during the general gun season. The FWC manages several WMAs for higher-quality hunting, imposing antler restrictions and hunter quotas. Antler restrictions are also common on private hunting lands throughout the state. Although Florida is not known for large-antlered deer, such restrictions have led to an increase in higher-quality antlered deer harvest in recent years.

GEORGIA

Data on legally harvested white-tailed deer (*Odocoileus virginianus*) were compiled from July 1, 1978 through June 30, 2003. Population models were used in conjunction with hunter harvest estimates to calculate population size. Specific objectives were to determine population levels, monitor condition indices, and disease frequency in the state as well as for individual physiographic provinces, and deer management units (DMU). Included in this report are data from 1978-2002 for the statewide population.

Minimum population estimates increased every year from 1979 to 1991. This trend changed in 1992 when the statewide population estimate showed a decline for the first time. The rapid increases depicted during the period from 1981 to 1986 are reflective of reduced either-sex hunting opportunities. During this period the adult buck population increased by 79.4% while adult does increased by 94.1%. These higher adult populations contributed significantly to the observed population increase of 66.8% from 1985 to 1991. This population increase stimulated gradual increases in either-sex hunting opportunities (more either-sex hunting days). The additional days were added to existing seasons, primarily in the Piedmont and in the Upper and Lower Coastal Plains. Additionally, in 1991 the statewide bag limit was increased from 3 deer total, no more than 2 antlered bucks to 5 deer total, no more than 2 antlered bucks. The bag limit was increased again in 2001 to 12, 10 antlerless and 2 antlered deer. Another change added in 2002 requires that 1 of the 2 antlered deer must have a minimum of 4 points, 1 inch or longer, on one side of the antlers. There are no antler restrictions for the other antlered buck except in 9 counties with special antler restrictions.

The increases in either-sex hunting days and bag limit during the 1990's seemingly provided the necessary opportunity for hunters to harvest enough deer to stop or at least slow the rate of growth in the statewide deer population. However, in terms of the extent of the effect on the population, the increases in harvest and percent does seen during the last 10-12 years may be misleading. Comparing estimates of total harvest relative to concurrent estimates of pre-hunt statewide populations shows that the removal rate by legal hunting increased less than 30%. In other words, hunters removed an average of 26% of the "standing crop" during the decade of the 1980's versus 33% during the 1990's. Given that pre-hunt populations are reported as minimum estimates (i.e., assumed to be conservative) and that, at least in some years, evidence indicates that statewide harvests were overestimated, it appears that these removal rates have not been great enough to achieve a sustainable reduction in the statewide deer population.

According to model estimates, the statewide population averaged slightly more than 1.2 million deer over the 10- year period 1993-2002 with peaks occurring in 1991 (1.31 million), 1997 (1.39 million) and 2000 (1.31 million). Previous estimates had indicated that the statewide population was declining after the peak in 1991, however, since 1995 the population has shown an increase in 4 of the 8 years through 2002. Statewide the percent does in the harvest ranged from 48.3% to 63.3% over the last 10 years, and from 22.0% to 63.3% for 1978-2002. Percent does in the harvest for 2002-2003 (63.3%) was higher than the 10-year average (53.1%). Despite this high figure for percent does, total doe harvest for the 2002 season was similar to recent years. However, the adult buck harvest for 2002 was 30% lower than in 2001 and was 36% lower than the 15 year average (96,757 vs. 150,723). This represents the largest one-year decrease in adult buck harvest on record. This likely is the result of the addition of a "4 points on one side" antler restriction. The adult buck harvest of 96,757 was 36% and 32% lower than the 15 and 20 year averages respectively. Further, the 2002

antlered deer harvest represents only 24% of the total harvest. This is the smallest proportion of the harvest recorded for antlered bucks in the 25 years of this study. The effects of this decrease in antlered harvest are unknown. The assumption is that many of the bucks that were not harvested as a result of the 4- point restriction will be available for harvest in future seasons. It is unlikely that the harvest of these bucks in subsequent seasons will offset the total decrease seen in the current harvest. However, if these passed over bucks are eventually harvested, they should be of somewhat better quality in terms of antler development.

KENTUCKY

Nestled among the Southeast, Midwest and Northeast, Kentucky is rapidly becoming known for its high quality deer herd. We have several luxuries in Kentucky including high quality soil, extensive agriculture and enthusiastic hunters. But the real reasons Kentucky's deer herd is in such good shape are timing and a little good luck. Restocking of whitetails in Kentucky was completed in 1999, much later than our southern counterparts. Therefore, Kentucky is dealing with a relatively young deer herd. Numbering about 800,000, Kentucky's deer population is well below carrying capacity and we intend to keep it that way. We have learned much from our neighbors: stay on top of herd growth, or you may never get control. Kentucky has promoted and instituted liberal antlerless harvest for over 10 years. In fact, 30% of the state has an unlimited bag limit on antlereless deer. Additionally, we are lucky to have a one buck limit, what we feel is the best approach to statewide QDM. We have consistently harvested more than 40% females over the past several years, and are often close to a 1:1 harvest sex ratio.

We do have problems, however. Kentucky is a small state with approximately 4.3 million residents and only 270,000 hunters. Annual hunter success rates in Kentucky are less than 40%, and of those successful hunters, the average number of deer harvested is 1.3. Despite liberal antlerless bag limits, our hunters are harvesting as many deer as they want. While annual harvest is currently around 110,000 deer, enough to slow growth combined with 40% doe harvest, we will soon have to do more with fewer hunters.

Kentucky continues to be one of the top states for quality deer hunting. During the 1992-1999 reporting periods, Kentucky was surpassed only by Illinois in the number of Boone & Crockett bucks produced per square mile of land area. We consistently harvest over 20 deer that qualify for Boone & Crockett recognition each year. Kentucky's deer management philosophy is simple. We intend to increase the quality of Kentucky's deer herd while achieving proper deer population levels.

LOUISIANA

Mention Louisiana and most non-residents conjure up thoughts of swamps, bayous and alligators. While Louisiana has its share of these, the Bayou State's environment is a little more diverse than what some people imagine. In his book Louisiana's Wildlife Inventory, Dr. Lyle St. Amant lists seven ecological divisions of the state. These areas include: the Lower Mississippi-Atchafalaya Alluvial Plain; Upper Mississippi , Tensas, Ouachita, and Red River Alluvial Plains; Northwest Louisiana Uplands; Southeast Louisiana Terrace Lands; Southwest Louisiana Terrace Lands; and Coastal Marshes. Deer can be found in all of these divisions and in all sixty-four parishes. The present population is estimated at around one million animals.

The Louisiana deer story is similar to that of most southeastern states. A once thriving deer population was reduced by a combination of habitat loss and unregulated hunting. Deer could only be found in remote swamp and bottomland areas and on a few protected refuges. This occurred between 1880 and 1925.

The Louisiana Department of Wildlife and Fisheries began a deer trapping and relocation program in the fifties. The program began slowly but, by 1970, deer had become established throughout the state. The restoration program was a success, and during the 1970s, deer herds continued to increase, resulting in a need for deer management programs. In the late seventies, LDWF began to assist hunting clubs and landowners with their deer management problems and needs.

The Wildlife Division of LDWF is divided into seven wildlife regions. The Deer Program Section coordinates the statewide program with the regions. Regional biologists are responsible for management of the herds on public and private lands within their region. Deer hunts are held annually, on the various wildlife management areas around the state (wmas). During the 2002-03 either-sex deer season on the wmas, a total of 2,993 deer were harvested with 31,524 hunter efforts. There were 1,425 cooperators enrolled in the Deer Management Assistance Program and these cooperators harvested 28,334 deer. The yearling buck harvest on these lands was 32% of the total buck harvest and is an all-time low for this age group. DMAP has been the tool that large clubs and landowners have used to increase the age structure of their buck population.

In 2002, an experimental antler program was established in three parishes in the area of the state known as the Atchafalaya Basin. This program came at the request of the local QDMA chapter who petitioned the Wildlife and Fisheries Commission to adopt this experiment. During the 2002 season the yearling buck harvest was reduced in these three parishes. The program was set to run for three years and may provide a means for both large and small landowners to increase the age structure of their buck population.

MARYLAND

Maryland often referred to as "America in Miniature" covers 4 physiographic regions – Coastal Plain, Piedmont, Ridge & Valley and the Appalachian Plateau. Forests cover 46% of the landmass. Woodlands vary from the northern hardwoods of the extreme western mountainous section of the state to the Atlantic Coast loblolly pine forests growing just above sea level adjacent to marshlands. Even with increasing development, agriculture remains Maryland's largest industry. Farming includes poultry, grain crops, truck crops, sod farms, nurseries and orchards.

By 1900 Maryland's deer population survived only in the remote western mountain sections. Habitat destruction and over hunting eliminated deer from the rest of the state. Restocking of deer began in the early 1900s when deer from Michigan, Pennsylvania and Wisconsin were released. Deer restocking accelerated after World War II with deer relocated from Aberdeen Proving Grounds, a U. S. Army weapons testing center located in Harford County Maryland.

Maryland's first deer season opened in the late 1920s with limited hunting in the remote Western Maryland. Mandatory check stations opened in 1931 with 31 deer taken in western Maryland. The first either sex deer hunting occurred in 1957. By 1960 the entire state opened for deer hunting except in Montgomery County.

Maryland currently has two Deer Management Regions for deer hunting regulations. The far western mountainous counties of Garrett and Allegany, with high hunting pressure and lower deer productivity, have 2 deer bag limits for each season (Bow, Firearm, Muzzleloader). One antlered deer and 1 antlerless deer may be taken for each season. Antlerless harvest is also controlled by either sex days. The other Deer Management Region consists of the remaining 21 counties. Ten antlerless and 2 antlered deer may be taken in each deer hunting season. Two antlerless deer must be taken before a second antlered deer is hunted during each season. Archers have no bag limit for antlerless deer within a 5 county Suburban Deer Archery Zone.

While Maryland's western and eastern sections remain predominantly rural, Maryland's central section is dominated by urban and suburban landscapes. Since the effectiveness of regulated deer hunting is limited in many of these central Maryland locales, deer numbers continue to grow within these developed counties. Managing deer in these highly developed sections is one of the major challenges of 21st Century deer management.

Maryland has one deer biologist dedicated to this urban/suburban region. The deer biologist's duties focus on deer management for private communities, government properties and corporate lands. The varying adjacent landscapes, attitudes of the surrounding communities and the comfort level of the property managers limit the implementation of lethal deer management options for these properties. Controlled managed hunts and sharpshooters are the most frequently used lethal deer management techniques.

Maryland's rural deer population appears to have stabilized and declined in some locales. The antlered buck harvest has declined in the past five years. Liberal antlerless bag limits and liberal deer crop damage regulations have helped to stop the rapid deer population growth in most rural Maryland landscapes.

MISSISSIPPI

As in most southeastern states, the historically abundant white-tailed deer population in Mississippi was virtually extirpated by the early 1900's. The absence of a regulatory agency with statewide authority to make and enforce state game laws compounded population declines which resulted from habitat changes associated with widespread deforestation. In 1929 Aldo Leopold reported isolated remnant deer herds existing only in limited portions of the Mississippi Delta and in the Pearl and Pascagoula River basins. This report was the catalyst which prompted the 1932 establishment of the Mississippi Game and Fish Commission by the state legislature. A successful deer restoration project, financed principally by federal funding through the Pittman-Robertson Act, was underway by 1940. Deer were initially imported from North Carolina, Kentucky, Texas, Alabama, and Mexico to refuges in Mississippi. With protection and public support, these populations flourished on Leaf River Refuge in the southeastern part of the state and Upper Sardis Refuge in north-central Mississippi. Hundreds of deer from these two sites were translocated throughout the state for restocking purposes.

The deforestation of the early 20th Century occurred throughout the eight physiographic regions of Mississippi. Rural, subsistence-level agriculture briefly became the dominant land use practice. But, subsequent second-growth forests created ideal conditions for exponential herd expansion. Currently, forested lands cover 18.6 million acres, or 62%, of the state's total land area. Major forest types include upland hardwood, bottomland hardwood, mixed-pine hardwood, and pine. The pine component is dominated by even-aged loblolly stands which are managed at varying degrees of intensity. Landowner objectives dictate management levels, with industrial landowners practicing the most intensive management. These practices range from natural regeneration of harvested stands all the way to mechanically and chemically site-prepared stands which are planted in bedded rows with genetically superior seedlings at excessive stocking rates and followed by additional herbicide treatments, fertilization, and pruning to release the crop trees. Browse abundance and species diversity decline as management level intensity increases. This perceived decline in habitat quality has caused criticism from both wildlife managers and hunters who lease the more intensively managed industrial and corporate landholdings. Private and public forest ownership in the state are 90% and 10%, respectively. In private ownership nearly two-thirds is individually owned, while industrial and corporate interests control the remainder.

The ability to manage an animal as adaptable as the white-tailed deer required information about species ecology and hunter objectives in all physiographic regions of the state. Baseline physiological indicators which allowed evaluation of population and habitat inter-relationships were unknown. Through a cooperative research program with Mississippi State University in 1976, the Mississippi Department of Wildlife, Fisheries and Parks gained information which provided biologists with the ability to evaluate population density relative to carrying capacity, using condition indicators rather than population estimates or browse surveys. This Cooperative Deer Management Assistance Program (DMAP) directly involved hunters in management through the collection of biological data. The interpretation of these data, in consultation with a biologist, is the guiding principle of DMAP. From a two-county pilot project in its first year, DMAP grew steadily until participation peaked in 1994 at almost 1,200 cooperators with over 2.7 million acres under management. Liberalized season structure and bag limits during the mid-1990's allowed land managers the flexibility to meet harvest objectives outside DMAP guidelines, which resulted in a decline in DMAP participation. Current enrollment includes 850 cooperators with 1.9 million acres. The philosophy of the technical staff

continues to be that it is imperative to provide sufficient harvest opportunity on private lands to allow accomplishment of individual management objectives.

Regulatory changes of significance in the last decade include the liberalization of antlerless hunting opportunity and the implementation of a "four point law" in the 1995-96 hunting season. Prior to these changes antlerless deer comprised only about 30% of the total harvest, while the percentage of 1½ year old bucks made up over 60% of the antlered buck harvest. As a result of these regulatory changes, statewide sex ratios have stabilized with equal numbers of bucks and does in the harvest. Concurrently, the percentage of 1½ year old bucks in the antlered buck harvest has improved to only about 20%.

Current issues that might impact existing management objectives and redirect future regulatory and management priorities include supplemental feeding and baiting, because of potential associated disease and ethical considerations. In addition, issues related to fencing may create dissension among hunters due to concerns about resource allocation and privatization of a public resource, and among both hunters and non-hunters about fair chase in sport hunting.

The continued success of the deer management program in Mississippi is related to the timely acquisition of adequate statewide harvest data which can be evaluated at the county level. Plans to implement a telephone-based harvest reporting and bag limit compliance system which can provide these data are in progress.

MISSOURI

Missouri has five distinct physiographic provinces. The Glaciated Plains, characterized by rolling hills and deep glacial till and loess soils, lies north of the Missouri River. Extant vegetation includes some native prairie and deciduous forest; however, much of the region has been altered by farming. The Ozark Plateau, located in southern Missouri, has thin soils and rocky terrain. Most of the area is forested with an oak-hickory cover type dominating and shortleaf pine common in the southeastern portions. Between these 2 largest provinces lie the Ozark Border and Osage Plain transition provinces. The Ozark Border is similar to the Ozark Plateau, however, its soils are richer and more productive. The Osage Plains is chiefly prairie in nature; however, most native prairie has been converted to cool season pastures. The Mississippi Lowland province, located in southeastern Missouri, is best described as a broad flat alluvial plain under intensive agriculture, with a small amount of bottomland hardwood forest.

Ninety-three percent of Missouri is in private ownership. Average farm size ranges from 183 acres in the Ozark Border to 484 acres in the Mississippi Lowland. The amount of land in crops varies from a low of 8% in the Ozark Plateau to 83% in the Mississippi Lowland. Leasing for hunting rights is uncommon but increasing throughout Missouri. Generally the better deer habitat occurs north of the Missouri River, although portions of the Ozark Border and Glaciated Plains offer excellent habitat. Deer densities, growth potential and reproductive rates are highest in these 3 regions. Deer abundance in the Ozark Plateau varies with habitat and hunter densities. Deer numbers are typically lower in the southeast Ozarks where productivity is lower and illegal harvest is high.

The history of deer in Missouri is similar to that in most Midwestern states. Prior to settlement, deer were abundant but populations declined rapidly from habitat loss and unrestricted harvest. In 1925 it is estimated there were only 395 deer left in the state. An aggressive program of public education, enforcement, reintroductions, and land acquisitions was successful in restoring the deer and in 1944 the first modern day deer season was held. It was a bucks-only season in a limited number of Ozark counties and 535 deer were taken. In 1951, the first any-deer season was held. Other major changes include the implementation of deer management units in 1970, an any deer quota system in 1975, and a bonus antlerless-only permit system in 1987.

Deer herd management in Missouri is accomplished on a unit basis. Quotas of permits that allow the harvest of antlerless deer are established annually for each of 57 management units. Antlered-only permits are unlimited. Quotas are based on population modeling, harvest statistics from mandatory check-ins, conservation agents' perceptions of populations and crop damage reports. Stabilization of deer populations in most parts of Missouri is desirable and emphasis in recent years has been on increasing doe harvests through liberal quotas.

NORTH CAROLINA

North Carolina has a diversity of habitat types ranging from the sounds and marshes of the Outer Banks coastal region to the highest mountains in the eastern United States. Regional habitat diversity also is evident in the state's 3 physiographic provinces. The lower Atlantic Coastal Plain region is comprised of marsh, flatwoods, and both lowland and upland swamps (pocosins). Many of the wetlands in this area have been drained and converted to pine forests and farms. The upper Coastal Plain is one of the major agricultural areas of the state. Primary forest types of the Coastal Plain are loblolly pine, oak-gum cypress, oak-hickory, oak-pine, pond pine, and longleaf pine. The Piedmont region is characterized by rolling hills and smaller farms and woodlots. Major forest types include oak-hickory, loblolly pine, oak-pine, Virginia pine, and shortleaf pine. The Appalachian Mountain region consists primarily of rugged mountains with shallow rocky soils in the highest areas to some fertile bottomlands and valleys in the lower elevations. Principal forest types of this region include oak-hickory, oak-pine, chestnut oak, white pine-hemlock, maple-beech-birch, and Virginia pine.

The history of deer management in North Carolina is similar to the other southeastern states. In the early 1900's it was estimated that only 10,000 deer were in the state. A buck law was established in 1927. The period from 1930 to 1960 was characterized by the restoration and recovery of deer herds. During this "buck management" phase, deer herds responded dramatically to the restoration efforts and protection they were afforded. By 1960, the statewide population was 250,000 animals and almost 30,000 were harvested. Either-sex seasons were established in 1959. The period of 1960 to 1980 was characterized by the "doe management" phase. Most management strategies involved the concept of trying to get more does in the harvest. Very little concern was given to the buck segment of the herds. The period since 1980 has been characterized by the "herd" management phase. Herd and habitat management schemes were established which attempted to make better utilization of both sexes and at the same time improve the quality of the deer harvested and the condition of the habitats. A Deer Management Assistance Program was initiated in 1981 to offer the concept of quality deer management to landowners and hunting clubs.

The 2003 pre-season population estimate was 1.0 – 1.1 million deer. During the 2003-04 hunting season, either-sex regulations allowed 6 does to be taken throughout the entire season (September-December). In the Coastal Plain, densities and buck harvests have stabilized somewhat and there have been accompanying increases in doe harvests (almost 50% of the total in many counties). Piedmont herds are being affected by urbanization, and conflicts between deer and people are becoming more evident. Work is ongoing to evaluate techniques for increasing antlerless harvests without adding to existing conflicts between hunters and landowners. Herds are continuing to increase in the good habitat of the foothills area of the upper Piedmont and lower Mountain regions. Mountain populations are relatively stable and either-sex hunting is being incorporated gradually into those areas where herds are sensitive to severe environmental conditions and fluctuations in high energy foods like acorns occur.

OKLAHOMA

Oklahoma's deer range provides sportsmen with varying topography, several different habitat types, and two species of deer to hunt. White-tailed deer occur throughout the entire state, while mule deer inhabit the panhandle and northwest counties.

Oklahoma slopes southeastward from an elevation of 5,000 ft at Black Mesa in the panhandle to 327 ft on the Red River in the southeastern corner. Topography is generally flat or rolling, exceptions being the Wichita Mountains in the southwest, the Arbuckle Mountains in the south-central section, and the Ouachita, Boston, and Ozark Mountains along the eastern border. Average annual precipitation ranges from a low of 15" in the panhandle to 45" in the southeast part of the state.

Four major forest types cover approximately 20% of the state. The most extensive forest type is the post oak-blackjack oak type, which occurs throughout the central region. Oak-hickory and oak-pine forests cover much of the eastern portion of the state. The pinon-juniper type is found only in the Black Mesa area of the panhandle, and represents an eastern extension of the Rocky Mountain flora. The remainder of the state is dominated by grasslands with tallgrass, mixed grass and short-grass prairies occurring east to west. Sand sage and shinnery oak grasslands are common along the western border and in the panhandle.

A highly successful restocking program helped Oklahoma's deer herd rebound from a low of 500 animals in 1916, to an estimated 325,000 animals today. Antlerless deer harvests were implemented in the mid-1970's under a zoned permit system. In 1982, this system was dropped in favor of a system which offers varying numbers of antlerless days depending on the harvest zone. Initially, sportsmen had difficulty accepting the idea of harvesting does, but harvest results clearly show that antlerless hunting has benefited Oklahoma deer hunters. The deer harvest trend during the past decade has seen a remarkable increase of 146%, including a 121% increase in the antlered buck harvest.

Perhaps the greatest challenge in managing Oklahoma's deer herd is that over 95% of the land is privately owned. Coupled with this is the fact that much of this land is used for an agriculture-based economy which is not always compatible with deer production. Deer habitat is especially scarce in the southwest portion of the state and in many areas of eastern Oklahoma, where forest succession

has advanced to the point of greatly reduced carrying capacity. A short nine-day gun season can also pose management problems if poor weather discourages participation of gun hunters, who typically account for 75% of the total harvest. Despite these obstacles, deer hunters have enjoyed record harvests four of the past five years.

SOUTH CAROLINA

South Carolina's deer herd reached an extremely low point around the turn of the last century with deer becoming essentially non-existent in the piedmont and mountains (the upstate). Fortunately there were good residual populations associated with the major rivers in the coastal plain. Restoration efforts began in the 1950's and involved the capture and relocation of approximately 314 deer from the coastal plain to the upstate. All restocking efforts utilized native deer. Over the last 20 years, changes in agriculture and more importantly, changes in forestry related activities have created exceptional deer habitat in most parts of the state. Currently, huntable populations exist in all 46 counties and many areas have over 50 deer per square mile and annual harvest rates of around 20 deer per square mile.

Deer hunting in South Carolina is characterized by two distinct season frameworks. The coastal plain encompasses 28 counties where the deer season begins on August 15 or September 1 and continues until January 1. In this region, roughly two-thirds of the state, dog hunting is allowed; however the activity is declining significantly. Baiting is allowed in the coastal plain and although there are short buck only archery seasons in a few coastal plain Game Zones, special weapons seasons are generally lacking. In much of the coastal plain there is no daily or seasonal limit on antlered deer. In the 18 county piedmont and mountains deer season begins on September 15 and October 1, respectively, and ends on January 1. There are early archery and/or primitive weapons seasons in all areas. Neither dog hunting or baiting is allowed in the upstate and the limit on antlered deer is 5.

With the exception of Wildlife Management Areas, season dates statewide are set in statute. In the coastal plain methods of taking deer are set in statute as are bag limits for antlered deer. In the upstate and on Wildlife Management Areas, bag limits and methods of take are set by SCDNR regulation. SCDNR has statewide authority with respect to the harvest of antlerless deer and as deer populations have increased, programs have provided more opportunity for hunters to harvest antlerless deer on all lands. Currently, all parts of the state have designated either sex days and typically every Friday and Saturday from October 1 to Thanksgiving are either sex days with additional days near the end of the season.

SCDNR offers two optional antlerless deer tag programs for the entire state. The Antlerless Deer Quota Program (ADQP) began in 1965 and continues today as a means for private landowners/lessees to harvest antlerless deer. With the ADQP, qualified applicants are issued an antlerless deer quota based on the density and condition of the local deer population, the size of the tract of land, and the recreational and agricultural objectives of the property owner. Currently, approximately 2,000 properties encompassing over 4.1 million acres participate in the ADQP. In 1994 a second program, the Individual Antlerless Deer Tag Program was implemented. Unlike the ADQP which is property based, this program is hunter based and allows anyone to purchase up to 4 antlerless deer tags which can be used on any property they are permitted to hunt (including many WMA's). Individual tags

cannot be used on properties already enrolled in the ADQP. Currently, over 46,000 hunters participate in the Individual Tag Program. With the liberalization of either sex days and the availability of two optional tag programs South Carolina deer hunters now harvest equal numbers of bucks and does.

Department objectives continue to include stabilization (reduction in some areas) of the deer population and increased efforts to moderate the social costs of a high deer population, e.g. agricultural depredation, deer vehicle collisions, urban deer situations, etc.

TENNESSEE

Tennessee is comprised of 8 distinct physiographic regions, ranging from mountains in the east to wide swampy river bottoms in the west. Elevations range from 200 feet above sea level along the Mississippi River in the west to 6,642 feet at Clingman's Dome in the Great Smoky Mountains. The wide range in elevations, topography, and soil classifications has resulted in a complex diversity of forest types, vegetation, and productivity. Consequently, deer habitat quality is very diverse across the state. Tennessee's most abundant deer herds are found in the highly interspersed forested and agricultural areas of the middle and western portions of the state, from which approximately 75% of the harvest is taken. The deer herds of the Cumberland Plateau and eastward, although smaller than those in the western part of the state, have showed continued growth. The relatively low habitat quality in the mountainous far eastern portion of the state will likely inhibit the deer population from reaching the densities realized in middle and western Tennessee.

Tennessee is blessed with abundant public hunting opportunities. Over 2,000,000 acres are open for hunting to the public, including approximately 1.3 million acres which are managed by state and federal agencies to provide a variety of hunting opportunities. Another 300,000 acres are privately owned timberlands that are part of the state's Public Hunting Area program, which provides public hunting access to large acreages for a small fee ($15-$30).

The history of Volunteer State's deer herd is similar to that of other states. By the turn of the century population densities where extremely low when it was estimated that fewer than 2,000 deer remained in Tennessee. Restoration of the state's deer herd was begun in the 1930's and 40's and continued until 1985. During the initial years of restoration, most deer were obtained from North Carolina, Texas, and Wisconsin. In subsequent years, deer were moved within state to stock areas with lower densities. From 1940 to 1985, over 9,000 deer were stocked in 72 of Tennessee's 95 counties. Since the 1940's, herd growth has been substantial and consistent, with the herd now estimated at 999,000. The deer harvest has grown accordingly, from 113 in 1949 to over 157,599 in 2001.

Tennessee is divided into two major deer harvest management units. Unit A comprises the middle and western counties of the state and has the longest seasons and the most liberal bag limits. Unit B comprises the eastern counties and has shorter seasons and more conservative bag limits. Within each unit, county deer herds are managed separately. Population models as well as other biological parameters (age/sex structure, weights, antler dimensions) are used to assess the status of each herd, and establish desired doe harvests. Doe harvests are implemented through the issuance of

quota permits allocated by drawing. Since 1975, the antlerless harvest in Tennessee has increased from 23% to over 38% of the total harvest in 2001.

Future deer management in Tennessee will continue to focus on the challenge of maintaining adequate doe harvests in the face of a stabilized or reduced hunter base. Also, the demand for quality/trophy deer opportunities is increasing in the state, and will have to be addressed in the near future.

TEXAS

Texas is comprised of 10 ecological areas. The Edwards Plateau is the limestone and granite "Hill Country" of west central Texas. The South Texas Plains, also known as the "Brush Country" is a level to rolling plain extending south and west from San Antonio to the Gulf of Mexico and the Rio Grande. The Cross Timbers and Prairies range from oak and mesquite savannah to dense brush. The Gulf Prairies and Marshes region, a slowly drained level area, is located along the Texas Coast. The Post Oak Savannah is a gently rolling area with elevations of 300-800 feet dominated by post oak and blackjack oak. The arid and mountainous Trans Pecos region is in the extreme western part of the state. The Blackland Prairies region is gently rolling to moderately rough and has agricultural and urban areas. The Rolling Plains and High Plains regions are located in the Panhandle where livestock grazing and irrigated farming dominate. The Pineywoods contains pines and bottomland hardwoods, much of which is in commercial forestry.

Early settlers found white-tailed deer in all areas of the state except the western and northwestern portions. Excessive harvest of deer for hides and meat to feed the settlers and early city-dwellers caused the species to decline by the late 1800s. Public concern prompted a series of protective measures. A 5-month closed season was enacted in 1881, and the first bag limit was 6 bucks in 1903. Six game wardens were hired in 1919 to patrol the entire state. Deer increased dramatically by the 1930s thanks to protective regulations, law enforcement, invasion of woody plants into the prairies, and restocking efforts.

Deer have expanded their range in Texas and over 83 million acres of the state are occupied by whitetails. There is a major problem with deer-human conflicts in subdivisions near cities. Texas allows private trapping and moving of deer under permit to help alleviate the problem. Bag limits and seasons have become more liberal to deal with the burgeoning deer population and to pique hunter interest.

Research and management experience in Texas continues to demonstrate the wisdom of selective harvest to produce bucks with superior antlers. Targeting deer with the smallest antlers as early as possible helps to ensure better quality bucks at maturity. Currently, some of the wildlife management areas emphasize harvest of bucks with 4 points or less through regulation. Many landowners under the technical guidance programs have programs that allow the harvest of the low-end bucks and "trophy bucks." Beginning in the 2002-2003 Season Texas began experimenting with mandatory antler restrictions in a 6-county area. In this area a legal buck must have a minimum of a 13" inside spread, OR at least one un-branched antler, OR at least 6 points on a side. These regulations will be evaluated over a 3-year period. Preliminary results indicate increasing age structure among bucks. This experimental regulation in those one-buck counties has gained in popularity, where pre-regula-

tion support by hunters and landowners was 70%. Harvest data indicates a potential need for a second buck in the bag, which should be restricted to a buck with at least one unbranched antler. Such a proposal would be an attempt to increase hunting opportunity while reducing risks of high-grading.

Managed Lands Deer Permits (MLDP) are made available to any landowner willing to follow guidelines provided by the local TPWD wildlife biologist or technician. If the landowner accepts the number of buck and doe permits that is biologically correct for the herd, then a special season and bag limit is designated for the property. That season is more than twice as long as the regular season to allow the landowner ample time to meet the objectives. The number of deer to be taken from the area is set by the number of permits issued; therefore, the long season and increased bag will not result in an increased harvest. In fact, the number of bucks allowed to be killed through MLD Permits should be less than that which the landowner would have allowed under regular county regulations.

Additionally, TPWD biologists may make recommendations on management activities such as livestock management, vegetation management, watering devices, and the like. The biologist will approve a wildlife management plan that considers all aspects of management and considers the effects of the management on other wildlife species as well as deer. The effect of the deer herd on the native habitat is the prime consideration for deer-harvest recommendations. If a landowner fails to make progress toward the herd and/or habitat objectives, that property may be dropped from the program in succeeding years until significant progress has been made.

While there is no minimum acreage required for the Managed Lands Deer Permit program, small land holdings are not expected to be enrolled because of the strict limitations on the number of bucks that may be harvested. Properties under “deer-proof” fence are eligible, but a high fence is not required. Small landowners are encouraged to join together in a cooperative effort to apply for MLD Permits. In that case, permits are issued to the cooperative’s officers, who are then responsible for distributing them fairly to the participating landowners. Landowners are encouraged to practice good management, regardless of the size of the place or the amount of money they have to invest in expensive management tools such as fencing or supplemental feeds.

Participating landowners must report the deer harvest to the Texas Parks and Wildlife biologist or technician who approved the plan. Managers are required to collect and submit data on the herd. Prior to the next season’s issuance, biologists will review the biological data collected from harvested deer (weights and measurements), survey data, and the habitat improvement progress. If the landowner has made an effort toward achieving the objectives, then permits can be issued.

Two special hunting weekends for youth-only (under 17 years of age) were established and the Texas Youth Hunting Association was formed to encourage young people to enter the hunting fraternity. There were approximately 530,000 deer hunters of all ages in 2003-04 and they took almost 437,000 deer from a herd estimated at 4,007,748.

VIRGINIA

The statewide deer kill during the 2005 hunting season was 215,082 (101,041 antlered males, 20,403 male fawns, 93,638 females (43.5%)). The archery, crossbow, and muzzleloading deer kill were 17,291 (8%), 5,476 (<3%) and 49,356 (23%) respectively. Deer kill data in Virginia represent an actual known minimum count. Data are obtained through mandatory tagging and subsequent checking at one of about 1,200 check stations located statewide. The mandatory check station system has been in operation continuously since 1947 and is operated by volunteers. In fall 2004, a telephone checking option was added and in fall 2006 an internet checking option was also added. The deer kill by county by year dating back to 1947 can be seen on the Department's web site at www.dgif.virginia.gov/hunting/va_game_wildlife/deer_harvest.asp .

Deer season in Virginia begins with a 7-week either-sex archery season that begins the first Saturday in October. Concurrent with the last two weeks of the archery season east of the Blue Ridge Mountains and the last week of the archery season west of the Blue Ridge Mountains is an early muzzleloading season. The early muzzleloading season is full season either-sex east and one-day either-sex west. In-line muzzleloaders with scopes are legal.

Two distinct season frameworks characterize general firearms deer hunting, which begins the Saturday prior to the third Monday in November. East of the Blue Ridge Mountains, the firearms season runs through the first Saturday in January (43 days). West of the Blue Ridge and in the south-western Piedmont, the firearms season is 13 days long. During the firearms season, either-sex deer can only be taken on prescribed either-sex days. West of the Blue Ridge the bag limit for all deer hunters (archers, muzzleloaders, and general firearms hunters) is 1 per day, 5 per season, three of which must be antlerless. Also during the early muzzleloading season west of the Blue Ridge, hunters are limited to one antlered buck. East of the Blue Ridge the bag limit for all deer hunters (archers, muzzleloaders, and general firearms hunters) is 2 per day, 6 per season, three of which must be antlerless. Bonus permits (for antlerless deer only) allow hunters to exceed the season bag limit statewide on private land(s) and designated public areas. No deer hunting is allowed on Sunday in Virginia.

In addition to the standard county seasons and bag limits, Virginia has several site-specific private land deer management programs including the deer management assistance program (DMAP) and the damage control assistance program (DCAP). Both programs were initiated during the 1988 season and continue to achieve wide acceptance. During the 2005 season, there were 837 DMAP cooperators encompassing 1.5 million acres in 92 counties. These DMAP cooperators were issued a total of 28,303 antlerless tags and reported a total deer kill of 23,517. Biological data is collected from all these animals. Also during the 2005 deer season, there were 1,276 DCAP cooperators comprising 366,000 acres. These DCAP cooperators were issued 12,918 antlerless tags and reported a kill of 4,169 antlerless DCAP deer.

Deer farming is no longer permitted in Virginia and only one grandfathered commercial fallow deer farm remains in business. Also, since 2001 high fencing (>=61 inches in height) of deer on private land is no longer legal. About twenty-three captive cervids facilities holding approximately 500 animals, which are mostly petting zoo type operations, are under Department regulation (no movement, mandatory tagging and testing, annual inventory, etc.). In fall 2006, a regulation was enacted making it illegal to feed deer statewide from September first through the first Saturday in

January. Lastly, insurance company estimates indicate that there are approximately 40,000 deer vehicle collisions annually in Virginia. The Department's deer management plan was updated and revised using a stakeholder advisory committee during 2005-06. It can be found on the Department's web site at www.dgif.virginia.gov .

Virginia's deer management program has been noted for both its success and its simplicity. The overall mission of the deer program is to manage the deer resource in the best long-term interests of the citizens of the Commonwealth. Today, with the exception of several counties in far southwestern Virginia and on selected National Forest lands in western Virginia, the emphasis on deer management in Virginia has changed from establishing and expanding deer herds to controlling deer herd growth. This change in management direction has resulted in liberal harvest regulations and high antlerless deer harvest levels.

Over the majority of the Commonwealth of Virginia, current deer management objectives call for the deer herd(s) to be stabilized at their current level.

WEST VIRGINIA

West Virginia, known as the "Mountain State", lies within the Allegheny Mountain Range. It is comprised of 3 major physiographic regions. The Eastern Ridge and Valley Section found in the far eastern portion of West Virginia is made up of oak-pine forests and has a drier climate. The Allegheny Mountains and Uplands make up the central portion of the state, and are comprised of a northern forest type with twice the rainfall of the eastern region. The remaining area, which is the largest in size, is the Western Hills Section. This section contains the Monongahela-Upper Ohio Province to the north and the Cumberland Mountains to the south. The region is characterized by the central hardwood forest type which is predominantly oak-hickory.

The average elevation of the state is higher than any other state in the east. The highest point in the state is Spruce Knob (4,862 feet), while the lowest is where the Potomac River flows out of West Virginia at Harpers Ferry (247 feet). Most of West Virginia is characterized by a branched (dendritic) drainage pattern.

West Virginia, with 12.1 million acres of forest land, is 79% forested. Most of the state's economy is associated with timber and other forest products. The oak-hickory forests, which are vital to the welfare of deer in West Virginia, cover 77% of the timberland.

Fertile soils are relatively uncommon in the state, so where they occur they are quickly adapted to farming. Bottomland soils are generally restricted to the floodplains of major streams. Terrace soils suited to farming are found along the Ohio River in the western portion of the state. Fertile upland soils containing limestone are found in eastern West Virginia.

West Virginia contains three national forests: the Monongahela, by far the largest, covering 901,678 acres; the George Washington, the second largest in the eastern portion of the state, covering 104,861 acres, and the Jefferson in southeastern West Virginia which covers 18,400 acres. In addition to this public land, the state owns or leases an additional 437,000 acres.

Deer in West Virginia reached their lowest level about 1910, following large scale logging operations and market hunting. Restocking programs were initiated in 1923 on a small scale, but as moneys were made available in 1939, restocking of deer escalated tremendously. Stocking of deer is no longer practiced in West Virginia with the exception of occasional releases of orphan animals from the Wildlife Center.

West Virginia sportsmen have experienced just about every type of season imaginable in the past, from bucks-only, to hunter's-choice, to permit hunting. In 1973, an antlerless deer permit system was established. From 1945 through 2003, 4,454,356 deer have been recorded as harvested in West Virginia. In 1970, the bag limit was 2 deer. Today, resident hunters may take as many as 9 deer. West Virginia offers a wonderful opportunity for deer hunter recreation and, with a progressive program, deer hunting in the mountains should remain excellent in the future.

Appendix II
State Deer Harvest Summaries

Table 1. Southeastern state deer harvest summaries for the 2005-2006 or most recent available season.

State	Land Area (sq. mi)	Deer Habitat		Percent Forested	% Land Area Public Hunting	Harvest		
		(sq. mile)	(% Total)			Male	Female	Total
AL	51,628	48,014	93	71	5	208,000	233,000	441,000
AR	52,609	44,718	85	53	12	70,480	47,229	132,415[10]
DE	1,954	714	36	15	8	6,144	7,362	13,670
FL	51,628	29,280	50	45	16			
GA	57,800	37,181	64	64	6	127,263	185,465	312,728
KY	40,395	39,654	97	59	9	70,176	76,025	146,201
LA	41,406	26,562	64	52	4	115,060	94,140	209,200
MD	9,837	8,766	89	46	4	44,288	49,764	94,052
MO	69,561	21,396	31	31	4	148,708	138,737	287,536
MS	47,296	31,250	66	66	6	138,648	143,803	282,450
NC	48,794	35,312	72	58	6	131,006	87,942	218,948
OK	69,919	37,425	54	19	2	57,614	42,988	100,602
SC	30,207	21,920	73	63	7.5	123,503	120,542	244,045
TN	42,246	25,770	61	49	9	95,061	71,005	166,066
TX	261,914	152,730	58	40	<2	247,026	217,352	464,378
VA	39,675	37,232	94	66	9	121,444	93,638	215,082
WV	24,064	22,889	95	79	9	136,215	118,348	255,356

Table 1. Continued.

State	Harvest/sq. mi. Deer Habitat	Method of Data Collection[1]	Estimated Pre-season Population	Length of Season (Days) Archery[2]	Black Powder[2]	Firearms	Method of Setting Seasons[3]	% Land Area Open to Dog Hunting
AL	9.2	A,B,C	1,600,000	110 C	22 A,B,C	77 C	A, B	70
AR	2.9	A,C	750,000	C 138	C 7	C 40	A,B	70
DE	19.1	A	50,000	131 C	14 A,B	35 A,B	A,B,C	0
FL		B		30	9	72	A,B	20
GA	8.4	A,C,D,E	1,021,000	115-146 A,B,C	80-95 A,C	73-88 C	A,B	70
KY	3.7	A,C,D	900,000	136 (C)	11 (A,B)	10-16	A,B	0
LA	7.9	A,B,C,H	750,000	123(C)	14(A,B)	65	A,B,C	80
MD	10.7	B,C,D,G	269,000	C-87	A3+9, B-13	A-13, B-2, + 1 Jr. day	A, B	0
MO	13.4	B,C,F	1,200,000	98	10	25	A,B	0
MS	9.0	A,B,C	1.75-2 million	50A, 12B	14A,12B	47	A,B,C	90
NC	6.2	A,B,C,D	1,139,000	24-54	6	18-68	A,B,C	50
OK	2.7	A, C, E	500,000	107	9	16	A, B	0
SC	11.5	A,B,C	750,000	16 A	10 A	70-140	A,B,C	60
TN	6.7	A,D	900,000	52	14	39	A,B,C	0
TX	3.04	B,C	3,326,400 [9]	30	9	81-94	A,B	0
VA	5.8	A,B,C,D	~950,000	36-66	12-24	13-43	A,B	55
WV	11.2	A	965,000	69 C	6 C	22 C	A,B,C	0

Table 1. Continued.

State	No. of Hunters[4]	5-Year Trend	Hunting License Fees (Full Season)		Tagging System		
			Resident	Non-Resident	Physical Tag? License Tag? None?	Mandatory? Volunteer? None?	Bonus Tags Available?
AL	198,900	Stable	$16	$252	None	None	N/A
AR	250,000	Stable	$10.50 – 25	$100 – 300	License Tag	Mandatory	Female/Mgt buck
DE	19,000	Down	$12.50	$86	Physical Tag	Mandatory	2 Antlered, Unlimited Antlerless
FL	150,000	Stable	$12	$151	Some WMA's	Mandatory	No
GA	238,383	Down	$19	$210	License Tag	Mandatory	WMA'S
KY	271,000*	Stable	$40.00	$165	License tag/ Hunter Log	Mandatory	Yes
LA	152,200	Down	$29-50	$300-352	None	None	None
MD	80,000	Down	$36.50	$130	Physical Tag	Mandatory	Antlered only
MO	475,000	Stable	$17	$145	License Tag	Mandatory	Antlerless only
MS	147,876	Stable	$18.85-33.85	$303.85-382.70	None	Volunteer-Telcheck	Antlerless, DMAP & FMAP
NC	219,000	Down	$25	$120	License Tag	Mandatory	No
OK	170,275	Stable	$20.00	$201	Carcass Tag	Mandatory	No
SC	141,307	Stable	$25	$225	None	None	Yes
TN	211,000	Stable	$56	$251	Physical	Mandatory	Quota permits
TX	539,086	Up	$23	$300	License Tag	None	MLDP permits
VA	~260,000	Stable	$37-72	$152-212	License Tag	Mandatory	Unlimited on private lands, antlerless only
WV	290,000*	Down	$25	$110	Physical Tag	Mandatory	Yes

Table 1. Continued.

State	Mandatory Hunter Ed.	Mandatory Orange	Handguns Permitted	Crossbows Permitted	Drugged Arrows Permitted	# Fatal Hunting Accidents		Highway Kill[5]
						All	Deer	
AL	Yes	Yes	Yes	Yes	No	3	2	22,006 (B)
AR	Yes	Yes	Yes	Yes	No	4	4	Unknown
DE	Yes	Yes	Yes	DDAP farms, Handicap, Gun	No	0	0	3,700 (B)
FL	Yes	Yes	Yes	Yes	No	0	0	Unknown
GA	Yes	Yes	Yes	Yes	No	4	2	50,000
KY	Yes	Yes	Yes	Season	No	2	2	2,840 (A)
LA	Yes	Yes	Yes	Handicap & >60	No	NA	1	2,500 (B)
MD	Yes	Yes	Yes	Handicap, 4 wks; >65	No	1	1	6,500(A)
MO	Yes	Yes	Yes	Yes, Firearms	No	3	1	7,663 (A)
MS	Yes	Yes	Yes	Yes, Firearms, Primitive Weapons	No	3	3	12,000 (B)
NC	Yes	Yes	Yes	Handicap	No	8	8	15,940
OK	Yes	Yes	Yes	Handicap	No			Unknown
SC	Yes	WMA's only	Yes	Gun, handicap, >62	Yes (28/46 co.)	1	1	910
TN	Yes	Yes	Yes	Yes	No	4	4	Unknown
TX	Yes	WMAs only	Yes	Yes	No	2	1	Unknown
VA	Yes	Yes	Yes	Yes	No	0	0	40,000 (B)
WV	Yes	Yes	Yes	No	No	2	2	17,180 (A)

Table 1. Continued.

State	Limits [6]			Antler Restrictions [7]	% Hunting Success			Avg. Leasing Fees/Acre
	Season	Antlerless	Antlered		Archery	Muzzleloader	Firearms	
AL	None	2 per day	1 per day	B,C (1 County, 5 WMA's)	~30	N/A	~60	$5-16
AR	3	1	2	A	?	?	?	$5.50
DE	None	4+	2	One buck must have a spread ≥15"	?	?	?	?
FL	2/day [6]	1or2/day [6]	2/day [6]	C	23	20	57	$2-4
GA	12	10	2	One buck must be 4-points on 1 side	27	21	49	$5-15
KY		varies	1	C (7 WMAs)	----------	32% Combined	----------	$5-8
LA	6	3	3	Yes (C)	24	34	57	$5-30
MD		Regional	Regional	No	34	C-36	44	$5-35
MO	varies	varies	3; 1 with firearm	Yes, 29 counties	15	-	39	$10
MS		3+2 Archery	3	C	50	55	70	?
NC	6	up to 6	2/4 [7]	NA	?	?	?	$2-6
OK	Gun	1	1	No	16	23	41	$2-5
SC	15+	10+	5+	C-8 WMA's	33	28	69	$8–10+
TN		Varies	3 statewide	None	----------	43% Combined	----------	$4.50
TX	5	Up to 5	Up to 3	C	63%	42%	61%	$6-12
VA	6 (east) & 5 (west)	6	3 (east)& 2 (west)	On 2 WMA's + 1 County	~30	~40	~50	$4
WV	9	Up to 8	Up to 5	1 WMA	22	18	58	$1-5

Table 1. Continued.

State	Private Lands Programs				Trailing wounded deer with dogs legal?	Supplemental feeding legal?	Baiting legal?
	Type[8]	Min. Acreage Requirements	Fee	No. of Cooperators			
AL	A	None	Yes	200	Yes	Yes	No
AR	A,C,D	200 ac	$25	A=264,D=3,000	Yes	Yes	Yes
DE	DDAP SDDAP	None	None	230 100	No	Yes	Yes
FL	A	640	None	1,250	Yes	Yes	Yes
GA	None				Yes	Yes	No
KY	B	None	No	495	Yes	Yes	Yes
LA	A,D	40	Yes	A=809,D=1012	Yes	Yes	Yes
MD	none				Yes	Yes	Yes, Private
MO	B	5	None	150,000	Yes	Yes	No
MS	A,D	Variable	None	652	Yes, dog seasons	Yes	No
NC	A	Regional; 1,000/500	$50	122	Yes, dog areas	Yes	Yes
OK	A	1,000	$200-400	154	No	Yes	Yes
SC	A	None	$50	1,708 3.8 mil ac.	Yes	Yes	Yes 28 co. No 18 co.
TN					With officer approval	Yes	No
TX	A,B,C	None	None	4,000	Most of Texas	Yes	Yes
VA	DCAP DMAP	None	None	1276; 837	Yes(east), No(west)	No (Sept 1 – first Sat in Jan)	No
WV	NONE				No	Yes	Yes

Table 1. Continued; footnotes.

[1] **A-Check Station; B-Mail Survey; C-Jawbone Collection; D-Computer Models; E-Telephone Survey; F- Telecheck; G- Butchers/Processors, H – Harvest card submitted end of season.**

[2] **A-Early Season; B-Late Season; C-Full Season.**

[3] **A-Harvest & Biological; B-Departmental/Commission Regulatory; C-Legislative.**

[4] **Asterisk if estimate includes landowner exempted hunters.**

[5] **A-Actual number based on reports; B-Estimated road kill.**

[6] **FL- A total of two deer may be harvested per day, both may be anterless deer during archery season and if taken with antlerless deer permits, only one/day may be antlerless during the 7-day antlerless deer season.; NC - Up to 2 bucks in those areas in the western season, northwestern season, and those areas of the central season where hunting with dogs is not allowed. Up to 4 bucks in those areas in the eastern season and those areas of the central season where hunting with dogs is allowed.**

[7] **A-Statewide Antler Restrictions; B-County Antler Restrictions; C-Region or Area Antler Restrictions.**

[8] **A-DMAP; B-Landowner tags; C-Antlered buck tags; D-Fee MAP.**

[9] **Texas population estimates should not be compared to previous years due to changed methodology.**

[10] **Total harvest includes 14,706 animals of undetermined sex.**