25th Annual Meeting

of the

Southeast Deer Study Group

February 17-20, 2002
Mobile, Alabama

Hosted by

Alabama Division of Wildlife and Freshwater Fisheries

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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.

SOUTHEAST DEER STUDY GROUP MEETINGS

YEAR	LOCATION	MEETING THEME
1977	Fort Pickett, VA	-
1979	Mississippi State, MS	-
1980	Nacogdoches, TX	-
1981	Panama City, FL	Antlerless Deer Harvest Strategies
1982	Charleston, SC	-
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

YEAR	LOCATION	MEETING THEME
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
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 the Deer Hunting
1999	Fayetteville, AR	QDM - What, How, Why and Where?
2000	Wilmington, NC	Managing Deer in Tomorrow's Forests: Reality vs. Illusion

YEAR	LOCATION	MEETING THEME
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

MEMBERS OF THE DEER COMMITTEE OF THE SOUTHEASTERN SECTION OF THE WILDLIFE SOCIETY

Name	State	Employer
Chris Cook	Alabama	Alabama Department of Conservation and Natural Resources
Michael E. Cartwright	Arkansas	Arkansas Game and Fish Commission
John Morgan	Florida	Florida Fish and Wildlife Conservation Commission
Robert E. Vanderhoof	Florida	Florida Fish and Wildlife Conservation Commission
Stephen M. Shea	Florida	St. Joe Timberland Company
Kent E. Kammermeyer	Georgia	Georgia Department of Natural Resources
Jon Gassett	Kentucky	Kentucky Department of Fish and Wildlife
Jonathan W. Day	Kentucky	Kentucky Department of Fish and Wildlife

Name	State	Employer
David W. Moreland	Louisiana	Louisiana Department of Wildlife and Fisheries
L. Douglas Hotton	Maryland	Maryland Department of Natural Resources
Stephen Demarais	Mississippi	Mississippi State University
Larry Castle	Mississippi	Mississippi Department of Wildlife, Fisheries and Parks
Jeff Beringer	Missouri	Missouri Department of Conservation
Lonnie Hansen	Missouri	Missouri Department of Conservation
Evin Stanford	North Carolina	North Carolina Wildlife Resources Commission
J. Scott Osborne	North Carolina	North Carolina Wildlife Resources Commission
Kenneth L. Gee	Oklahoma	Samuel Roberts Noble Foundation
Michael G. Shaw	Oklahoma	Oklahoma Department of Wildlife Conservation
David C. Guynn, Jr.	South Carolina	Clemson University
Charles Ruth	South Carolina	South Carolina Department of Natural Resources
Ben Layton	Tennessee	Tennessee Wildlife Resources Agency
Clayton Wolf	Texas	Texas Parks and Wildlife Department

Name	State	Employer
Bob Zaiglin	Texas	Harrison Interest LTD
W. Matt Knox	Virginia	Virginia Department of Game and Inland Fisheries
Jim Crum	West Virginia	West Virginia Department of Commerce, Labor and Environmental Resources

SOUTHEAST DEER STUDY GROUP AWARDS

Southeast Deer Study Group 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

Southeast Deer Study Group 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. Lopez (Texas A & M University)
2000 – Karen Dasher (University of Georgia)
2001 – Roel R. Lopez (Texas A&M University)

SUNDAY, FEBRUARY 17, 2002

1:00 – 6:00 p.m.	Registration – 2nd Floor Preconvene Area
3:00 – 5:00 p.m.	Southeast Deer Committee Meeting – 2nd Floor, Mobile Ballroom II
7:00 – 10:00 p.m.	Social/Dinner – Battleship Memorial Park (Name Badge Required) Buses begin loading in front of Adam's Mark at 5:45 p.m.

MONDAY, FEBRUARY 18, 2002

7:00 a.m. – 5:00 p.m.	Registration – 2nd Floor Preconvene Area
8:00 a.m.	Welcome

Opening Session – Modern Deer Management – Balancing Biology, Politics, and Tradition

Moderator: Gary H. Moody, Wildlife Section Chief–
Alabama Division of Wildlife and Freshwater Fisheries

8:10 a.m.	Introduction – Gary H. Moody
8:20 a.m.	*Shoot or Don't Shoot - Whose Objectives Dominate.* Todd Holbrook, Game Management Section Chief – Georgia Wildlife Resources Division
8:55 a.m.	*Incorporating Public Values in Deer Management: Planning Lessons From Virginia.* David E. Steffen, Forest Wildlife Program Manager – Virginia Department of Game and Inland Fisheries
9:30 a.m.	*Pennsylvania's Deer Management Program – Creating New Traditions.* Gary Alt, Deer Management Section Supervisor – Pennsylvania Game Commission
10:05 a.m.	**Break**

Technical Session I

Moderator: Stephen S. Ditchkoff, Assistant Professor – School of Forestry and Wildlife Sciences, Auburn University

10:30 a.m. *Nationwide Trends in White-tailed Deer Densities, Hunting Regulations, and Hunter Selectivity.* Nikole L. Castleberry, Tamara M. Terry, and Brian P. Murphy – The Quality Deer Management Association

10:50 a.m. *Virginia's Deer Management Programs to Meet the Demands of an Ever-Changing Society.* David M. Kocka, W. Matt Knox, Brad W. Howard, and W. Dan Lovelace – Virginia Department of Game and Inland Fisheries

11:10 a.m. *Local Government Deer Management: Meeting Community Concerns When Stepping Out of the Box.* Philip C. Norman – Howard County, Maryland Department of Recreation and Parks

11:30 a.m. *Predicting Potential Concentrations of Negative Deer-Human Interactions in Arkansas.* Philip A. Tappe and Paul B. Medley – University of Arkansas - Monticello

11:50 a.m. **White-tailed Deer Management Strategies of Registered Deer Camps in Arkansas.* Bret A. Collier – University of Arkansas

12:10 p.m. **Lunch (on your own)**

Technical Session II

Moderator: Grant R. Woods, Wildlife Research Biologist – Woods and Associates, Inc.

1:30 p.m. *A Five-Year Case Study of Quality Deer Management in Russell County, Alabama.* Donald E. Wood – Mead Corporation and William N. Gray – Alabama Division of Wildlife and Freshwater Fisheries

1:50 p.m. *Quality Deer Management at Chesapeake Farms: Formula for Small Property Success.* Mark C. Conner – DuPont Crop Protection, Christopher S. Rosenberry – North Carolina State University, and Jeannine A. Tardiff – Chesapeake Farms

2:10 p.m. *Applying Quality Deer Management to Gulf States Paper Corporation's Industrial Forestlands.* Kevin A. McKinstry and Bill Baker – Westervelt Wildlife Services and John Roboski – Gulf States Paper Corporation

2:30 p.m. *A Questionable Paradigm, the 1:1 Sex Ratio for Trophy Deer Management.* Harry A. Jacobson – Mississippi State University

2:50 p.m. **Reproductive Success of Wild White-tailed Deer Males in South-Central Oklahoma.* Randy W. DeYoung and Stephen Demarais – Mississippi State University, Kenneth L. Gee and Robert A. Gonzales – Samuel Roberts Noble Foundation, Rodney L. Honeycutt – Texas A&M University, and John H. Holman and Ann R. Harris – Samuel Roberts Noble Foundation

3:10 p.m. **Break**

Technical Session III

Moderator: Steve Shea, Wildlife Biologist – St. Joe Timberland Company

3:35 p.m. **Multiple Paternity in White-tailed Deer Revealed by DNA Microsatellites.* Randy W. DeYoung and Stephen Demarais – Mississippi State University, Robert A. Gonzales – Samuel Roberts Noble Foundation, Rodney L. Honeycutt – Texas A&M University, and Kenneth L. Gee – Samuel Roberts Noble Foundation

3:55 p.m. *Male Reproductive Physiology and Offspring Sex Ratio in Deer.* Lisa I. Muller – University of Tennessee, Stephen Demarais and Randy W. DeYoung – Mississippi State University, H. David Guthrie and Glenn R. Welch – USDA Agricultural Research Service, and Terry Engelken – Mississippi State University

4:15 p.m.	**Factors Affecting Secondary Sex Ratio Bias in Free-Ranging White-tailed Deer*. Bronson K. Strickland and Stephen Demarais – Mississippi State University and Larry Castle – Mississippi Department of Wildlife, Fisheries, and Parks
4:35 p.m.	**Management Implications of Adaptive Fetal Sex Ratio Allocation in White-tailed Deer*. Markus N. Peterson, Roel R. Lopez, and Nova J. Silvy – Texas A&M University
4:55 p.m.	*Density-dependent Reproductive Patterns in White-tailed Deer*. Patrick D. Keyser – Westvaco Corporation and David C. Guynn, Jr. – Clemson University
5:15 p.m.	**Dinner (on our own)**
7:00 p.m.	Shooting From The Hip: *Mandated Antler Restrictions: What Role Should State Agencies Play?* M.N. Pugh – Alabama Division of Wildlife and Freshwater Fisheries, Todd Holbrook – Georgia Department of Natural Resources, Donnie Harris – Arkansas Game and Fish Commission, and Larry Castle – Mississippi Department of Wildlife, Fisheries, and Parks

TUESDAY, FEBRUARY 19, 2002

7:00 a.m. – 5:00 p.m.	Registration – 2nd Floor Preconvene Area
8:00 a.m.	Welcome

Technical Session IV

Moderator: Charles Ruth, Statewide Deer Project Supervisor – South Carolina Department of Natural Resources

8:05 a.m.	**Efficacy and Behavioral Observations for Does Treated with Prostaglandin $F_{2\alpha}$ During Mid-gestation*. Meredith S. Tart, Robert J. Warren, and David A. Osborn – University of Georgia and Darrel J. Kesler – University of Illinois

8:25 a.m. *Contragestation in Captive White-tailed Deer: A Comparison of 3 Treatments for Inducing Abortions.* David A. Osborn and Robert J. Warren – University of Georgia, Darrel J. Kesler – University of Illinois, and José Sulon and Jean-Francois Beckers – University of Liége

8:45 a.m. *Application of Fertility Control for Urban Deer Management on Kiawah Island, South Carolina.* James D. Jordan – Town of Kiawah Island, Robert J. Warren – University of Georgia, and Darrel J. Kesler - University of Illinois

9:05 a.m. **Efficacy of Carfentanil-Xylazine for Immobilization of White-tailed Deer.* Brad F. Miller, Kent A. Adams, Lisa I. Muller, Timothy N. Storms, and Edward C. Ramsay – University of Tennessee and David A. Osborn, Robert J. Warren, and Karl V. Miller – University of Georgia

9:25 a.m. *Use of Dental Measurements to Estimate Age of Yearling White-tailed Deer.* Stephen M. Shea – St. Joe Timberland Company and Robin Governo, M. Keith Causey, and Stephen S. Ditchkoff – Auburn University

9:45 a.m. *The Yearling Disadvantage in Alabama: Effect of Birth Date on Development.* William N. Gray – Alabama Division of Wildlife and Freshwater Fisheries, Stephen S. Ditchkoff and M. Keith Causey – Auburn University, and Christopher W. Cook and Steven K. Watkins – Alabama Division of Wildlife and Freshwater Fisheries

10:05 a.m. **Break**

Technical Session V

Moderator: Kevin A. McKinstry, Project Director – Westervelt Wildlife Services

10:30 a.m. **Evaluating the Effectiveness of Different Deer Population Estimation Techniques in the Central Appalachians.* Christopher A. Langdon and John W. Edwards – West Virginia University, James M. Crum – West Virginia Division of Natural Resources, and W. Mark Ford – USDA Forest Service

10:50 a.m.	*A Comparison of Methods for Obtaining Perpendicular Distances From Non-linear Transects.* Brian L. Pierce – Texas A&M University and John T. Baccus, Richard W. Manning, and Thomas R. Simpson – Southwest Texas State University
11:10 a.m.	**Censusing White-tailed Deer With Infrared-Triggered Cameras Placed at Soybean Feeders.* Matthew A. Kearley and M. Keith Causey – Auburn University
11:30 a.m.	**Evaluation of Infrared-Triggered Camera Census Techniques Without the Use of Bait.* Christopher E. Comer, Gino J. D'Angelo, Karl V. Miller, Cory Drennan, and David A. Osborn – University of Georgia and John C. Kilgo - USDA Forest Service
11:50 a.m.	*A Deer Guard to Prevent Access to Roadways: Part II.* Roel R. Lopez and Nova J. Silvy – Texas A&M University, and Phil Frank – National Key Deer Refuge
12:10 p.m.	**Lunch (On your own)**

Technical Session VI

Moderator: John Morgan, Deer Management Section Leader – Florida Fish and Wildlife Conservation Commission

1:30 p.m.	**Supplemental Feeding of Free-Ranging White-tailed Deer With Raw Soybeans.* Matthew A. Kearley and M. Keith Causey – Auburn University
1:50 p.m.	**Spatiotemporal Characteristics of Female White-tailed Deer in the Central Appalachians of West Virginia.* Benjamin R. Laseter, Tyler Campbell, David Osborn, and Karl V. Miller – University of Georgia and W. Mark Ford – USDA Forest Service
2:10 p.m.	*Stored Crop Loss Due to Deer Consumption.* Kurt C. VerCauteron and Mike Pipas – USDA National Wildlife Research Center and Phil Peterson and Scott Beckerman – USDA Wildlife Services

2:30 p.m.	**Short-Term Understory Vegetation Responses to Deer Exclosures at Arkansas Post National Memorial.* Christopher L. Watt and Philip A. Tappe – University of Arkansas – Monticello
2:50 p.m.	**Break**

Technical Session VII

Moderator: Donald E. Wood, Wildlife Biologist – Mead Corporation

3:15 p.m.	*The National Wildlife Research Center's Efforts to Control Bovine Tuberculosis.* Kurt C. VerCauteron, Tom DeLiberto, and Gary Witmer – USDA National Wildlife Research Center
3:35 p.m.	*Hemorrhagic Disease in White-tailed Deer: Our Current Understanding of Risk.* David E. Stallknecht and E. W. Howerth – University of Georgia and J. K. Gaydos – University of California-Davis
3:55 p.m.	*White-tailed Deer and Tickborne Zoonoses: Emerging Public Health Issues and Deer Management.* William R. Davidson, David E. Stallknecht, and Susan E. Little – University of Georgia
4:15 p.m.	*Fate of Rehabilitated, Vasectomized Buck Fawns Released on Ossabaw Island, Georgia.* John W. Bowers and Dan L. Forster – Georgia Department of Natural Resources
6:00 p.m.	**Social Hour**
7:00 p.m.	**Banquet (Name Badge Required)**

*** Indicates Student Paper**

ABSTRACTS

Monday, February 18, 2002

Opening Session – Modern Deer Management – Balancing Biology, Politics, and Tradition

Moderator: Gary H. Moody, Wildlife Section Chief–
Alabama Division of Wildlife and Freshwater Fisheries

8:20 a.m.

Shoot or Don't Shoot - Whose Objectives Dominate. Todd Holbrook, Game Management Section Chief – Georgia Wildlife Resources Division

State wildlife agencies in general and Georgia in particular have been faulted for managing deer herds to benefit the "lowest common denominator" of hunters. Agency philosophies and ultimately regulations are perceived by some to benefit the young, the old, the infirm, or the incompetent at the expense of a new generation of elite. This mainstream elite, who advocate restraint in buck harvest through regulated antler restrictions, now are a majority in many locations. Their objectives are legitimate. So too are the objectives of those who do not wish to be incumbered with regulated, traditional QDM. The problem for state wildlife agencies lies in conflicting objectives and the refusal of adversaries to recognize legitimacy of opposing views. A responsible state wildlife agency must respond to a large and growing constituency of hunters who are looking for and willing to sacrifice opportunity for an older-aged buck population. In responding, the responsible agency also must consider and mitigate impacts of a regulatory and enforcement approach to traditional QDM on certain segments of the hunting population. Why? In Georgia, young hunter participation in QDM counties ($n=6$) was lower than that in non-QDM counties ($p<0.005$). Survey results indicate that young licensed hunters (age 16-25) and older hunters (age 56+) were less supportive of options for statewide-regulated QDM than were hunters between these ages. Licensed, resident hunters in Georgia have declined from 352,000 in 1985 to 291,000 in 2000. This decline has been most obvious in dropping participation of young hunters. In my opinion, the wildlife profession made an error when it pushed antler restrictions and protection of a single age class as the sole technique for correcting buck age structure problems through regulations. A combination of techniques, that may or may not include antler restrictions, might better address QDM population objectives and simultaneously mitigate negative impacts on the "lowest common denominator".

8:55 a.m.

Incorporating Public Values in Deer Management: Planning Lessons From Virginia. David E. Steffen, Forest Wildlife Program Manager – Virginia Department of Game and Inland Fisheries

Established during the early 1900s to provide technical expertise and legal authority, wildlife agencies were expected to make unilateral management decisions on behalf of stakeholders and public resources. During the later part of the 20th Century, resource management has evolved to include a more meaningful public role. Involvement of the public in management programs also has been identified as a characteristic of effective wildlife agencies and adds to agency credibility. Recognizing the broad base of public interest in deer management issues, the Virginia Department of Game and Inland Fisheries (VDGIF) and Virginia Tech guided stakeholder involvement to develop a publicly driven deer management plan. Involvement by informed stakeholders resulted in the expression of public values in the form of deer management goals, objectives, and preferred strategies. While the VDGIF retained the ultimate responsibility for deer management, the planning process produced shared decisions between stakeholders and management professionals. The VDGIF strives to use a planning and management paradigm that recognizes public involvement is more meaningful for some kinds of issues than for others. Stakeholder influence is most important for value-laden issues while the professional role is most significant for technical concerns. Attempting to demystify planning jargon and principles, Virginia's public involvement philosophy toward management plan development is presented from a practical state agency perspective. Added experience with the subsequent development of a black bear management plan has reinforced lessons in balancing biological dimensions with public values in Virginia.

9:30 a.m.

Pennsylvania's Deer Management Program – Creating New Traditions. Gary Alt, Deer Management Section Supervisor – Pennsylvania Game Commission

Pennsylvania is currently making some of the most sweeping changes to their deer management program ever. Our traditional two-week "buck" season followed by a three-day "doe" season consistently led to overharvest of antlered deer, underharvest of antlerless deer, and severe, long-term overbrowsing of thousands of square miles of forest. To correct these problems we have converted the traditional "buck" season to a concurrent either-sex season, created several prerut (October) antlerless seasons, liberalized antlerless license allocations, and proposed changes in antler restrictions. These changes have been made possible by a very aggressive

public relations program aimed at legislators, policy makers, and sportsmen. Hundreds of public lectures, thousands of free videos describing our program, newspapers, magazines, TV, and radio have all played an integral role in creating new and improved traditions with our deer management program.

Technical Session I

Moderator: Stephen S. Ditchkoff, Assistant Professor –
School of Forestry and Wildlife Sciences, Auburn University

10:30 a.m.

Nationwide Trends in White-tailed Deer Densities, Hunting Regulations, and Hunter Selectivity. Nikole L. Castleberry, Tamara M. Terry, and Brian P. Murphy – The Quality Deer Management Association

Many factors affect the number and quality of white-tailed deer (*Odocoileus virginianus*) harvested annually. We surveyed all state wildlife agencies to examine national and regional trends in deer density, statewide harvests, sex ratio and age structure of harvest, harvest regulations, and the number and acreage of state- or federally-managed quality deer management (QDM) areas from 1989-1999. Complete or partial data were provided by all states with whitetails within their boundaries (45). During the study period, nationwide deer populations increased 29% to approximately 27,415,538, with several states not providing population data. The harvest of antlered and antlerless deer increased 23% and 55%, respectively. In 1999, the harvest of antlerless deer exceeded that of antlered deer for the first time. Additionally, the percentage of 1.5-year-old bucks in the harvest decreased 10%, while the proportion of 2.5- and 3.5-year-old bucks increased by 5% and 4%, respectively. Similar trends were observed in the Southeast. Whitetail populations increased 28% to 18,678,103. The harvest of antlered and antlerless deer increased 24% and 72%, respectively. The percentage of 1.5-year-old bucks in the harvest decreased 15%, while the percentage of 2.5- and 3.5-year-old bucks increased by 9% each. Trends suggest increasing willingness by hunters to harvest more antlerless deer and restrict antlered buck harvest. This was especially true in the Southeast, where QDM practices have a longer history. Despite these trends, our data suggest increased antlerless deer harvest will be necessary to stabilize or reduce whitetail numbers.

10:50 a.m.

Virginia's Deer Management Programs to Meet the Demands of an Ever-Changing Society. David M. Kocka, W. Matt Knox, Brad W. Howard, and W. Dan Lovelace – Virginia Department of Game and Inland Fisheries

Virginia's modern deer management programs must meet the challenges of urban/suburban deer, herds in confined government installations, deer damage to agricultural crops, a growing interest in quality deer management (QDM), as well as the demands of the traditional hunting constituents. No single program will successfully address all of these varying situations and many problems require site-specific solutions. Virginia's deer management plan directs staff to provide/promote site-specific programs to meet the objectives of both population and damage goals; these include out-of-season kill permits, DCAP (damage control assistance program), DMAP (deer management assistance program), and DPOP (deer population control program). Kill permits (limited by the Code of Virginia to commercial agricultural producers) and DCAP address most agricultural damage and some urban situations that arise. Although producing better quality bucks is the predominant reason for joining DMAP (612 cooperators in 2000), population reduction and damage control are other reasons people enroll their lands; a 1999 survey indicated expectations of population reductions and damage control were being met or exceeded by the DMAP program. Under the authority of a regulation passed in 1997, the DPOP program provides options for extended-season recreational hunting and sharpshooting. In 2000, 27% of the 15 DPOP permits issued were for the recreational hunting option. DPOP sharpshooting option is relied upon in those situations currently excluded from out-of-season kill permits. In addition to the 187,878 checked in by sportsmen during 2000, another 5,108 deer were killed either on out-of-season kill permits or under the DPOP sharpshooter option. Site-specific programs appear to be most successful when they remain flexible and are a blend of both technical and public input. When combined, these programs meet the needs of the various situations faced by deer managers in the 21st century. Highlights of each program and examples of each will be discussed.

11:10 a.m.

Local Government Deer Management: Meeting Community Concerns When Stepping Out of the Box. Philip C. Norman – Howard County, Maryland Department of Recreation and Parks

Howard County, Maryland, located midway between Washington, D.C. and Baltimore, is a fast-growing and affluent suburban area. By the mid-1990s, the population of white-tailed deer (*Odocoileus virginianus*) in many parts of the county had risen to such levels that both man-made and natural environments were being

negatively affected. In the fall of 1997, the Department of Recreation and Parks was directed to initiate a program to reduce the population of white-tailed deer in the Middle Patuxent Environmental Area (MPEA) through licensed sport hunting. The Department also was encouraged to pursue non-lethal means of managing over-abundant deer. Facing intense pressure from proponents and opponents of lethal management, as well as the safety concerns of nearby residents, a hunting program was developed which possesses several levels of qualification to ensure participants are knowledgeable, law-abiding, ethical, safety-minded, and effective. Questionnaires, interviews, police records checks, safety training, and marksmanship qualification are used to screen applicants and develop a roster of participants who are then guaranteed several opportunities to hunt under special exemptions from regular bag limits and seasons. Safety controls and restricted hunter density also make this program attractive to applicants, who are asked to volunteer time for support activities in exchange for a reduction in registration fees. Now in its fourth season, and expanded to include nearby David W. Force Park (DFWP), there have been no safety violations or hunt-related accidents in the program's history. Over 400 deer have been removed from approximately 1,285 acres, with more than 100 being donated to various charitable purposes. Community support continues to be strong, though not universal.

11:30 a.m.

Predicting Potential Concentrations of Negative Deer-Human Interactions in Arkansas. Philip A. Tappe and Paul B. Medley – University of Arkansas – Monticello

An expanding human population combined with a growing white-tailed deer (*Odocoileus virginianus*) population has resulted in an increase of negative deer/human interactions in Arkansas. These interactions range from the eating of ornamental plants and damage to household gardens, to very costly deer-vehicle collisions and agricultural crop damage. To address growing concerns over negative deer/human interactions, we are developing a statewide model using spatially explicit data sets integrated within a geographic information system (GIS) to aid administrators and natural resource managers in identifying locations where negative interactions may be concentrated. Data incorporated into the model include (1) county-level deer density indices; (2) geographic distributions of deer depredation permits; (3) human population densities and growth trends for Census Blocks, Metropolitan Areas, Incorporated Places, and Census Designated Places; (4) road densities and characteristics for counties; (5) average daily traffic counts by road segments; (6) deer-vehicle collision locations obtained from Arkansas State Police accident reports; and (7) composition and characteristics of landcover derived from satellite imagery. Spatial and temporal combinations and intersections of

variables indicating potential, current, or future "hotspots" of negative human/deer interactions are being identified and mapped.

11:50 a.m.

***White-tailed Deer Management Strategies of Registered Deer Camps in Arkansas. Bret A. Collier – University of Arkansas**

In the southeastern United States, there is little information on white-tailed deer (*Odocoileus virginianus*) management strategies used on private lands. The Arkansas Deer Camp Program was initiated in 1988 to facilitate collection of biological data from deer harvested on privately owned or leased lands in Arkansas. However, little information concerning white-tailed deer management strategies used on these private lands has been collected. I conducted a mail survey of all registered deer camps in Arkansas to gather information on the wildlife management strategies currently in use on these areas. Of the 3,189 camps surveyed, 26% of those contacted responded. Of these respondents, 38% stated their camp was under a Quality Deer Management Program. Forty-three percent of the responding clubs implemented more restrictive management practices than those set by the Arkansas Game and Fish Commission (AGFC). The most cited management objective (29%) given by the respondents was to improve antler development and physical condition of the deer herd. This objective was being managed for by restricting the harvest to allow more bucks to reach age classes of >2.5 years. The primary method used to reach this objective (24%) was a restricted antlerless harvest (no "button bucks"). Seventeen percent of the respondents worked with an AGFC biologist to establish management plans, however, 60% felt their club would benefit from increased management assistance from the AGFC. This information will assist in the development of local and regional white-tailed deer management efforts for private lands in Arkansas.

Technical Session II

Moderator: Grant R. Woods, Wildlife Research Biologist – Woods and Associates, Inc.

1:30 p.m.

A Five-Year Case Study of Quality Deer Management in Russell County, Alabama. Donald E. Wood – Mead Corporation and William N. Gray – Alabama Division of Wildlife and Freshwater Fisheries

Quality deer management (QDM) has rapidly gained acceptance as a deer management philosophy. However, few studies have provided information quantifying the impacts of this management strategy. During a 5-year period from 1996-2001, we evaluated the impacts of QDM on an approximate 11,000 acre Mead Corporation property in Russell County, Alabama. Deer hunters were required to collect observation data and deer harvest data and were periodically monitored to ensure complete and accurate data collection. Adult does were collected to evaluate fetal productivity and timing of conception. From year one to year five of the study, total deer harvest decreased from 260 to 135. Doe harvest decreased from 210 to 94. Buck harvest decreased from 50 to 41. Harvest of mature bucks (≥2.5 yrs) peaked in year 3 of the study. However, in year five, hunters reported the greatest number of buck observations ever recorded during the course of the study. Productivity per doe decreased from 1.9 fetuses in 1997 to 1.75 fetuses in 2000. Mean date of conception shifted forward 16 days when comparing 1997 versus 2000 data. A complete report, including year six results, will be presented.

1:50 p.m.

Quality Deer Management at Chesapeake Farms: Formula for Small Property Success. Mark C. Conner – DuPont Crop Protection, Christopher S. Rosenberry – North Carolina State University, and Jeannine A. Tardiff – Chesapeake Farms

Effectiveness of quality deer management (QDM) on relatively small properties varies. Under QDM, increased antlerless harvests and protection of young bucks are expected to balance sex ratios and produce more adult males in the harvest. We tested these hypotheses at the 3,300-acre Chesapeake Farms from 1985 to 2000. During 1985–1993 (Pre-QDM), average harvest of antlered males and does was 30 and 89, respectively. Hunter-reported antlered:antlerless ratio was 1:11. During 1994–1996, males with ≤6 antler points were protected from harvest and doe harvest increased, producing an average annual harvest of 23 antlered males and 120 does. Observed antlered:antlerless ratio was 1:8. Antlered males with an

outside spread of ≤16 inches were protected from harvest during 1997–2000 (spread rule) and doe harvest was increased. Resulting average harvests consisted of 31 antlered males and 144 does. Observed antlered:antlerless ratio was 1:5. Observed antlered:antlerless ratio showed an increasing trend ($P < 0.001$) and age structure of antlered harvests increased significantly ($P < 0.01$) from Pre-QDM to the spread rule period. Pre-QDM, 58% of harvested antlered males (n=272) were yearlings and 22% were ≥3.5 years of age. During the spread-rule period, 14% of harvested antlered males (n=125) were yearlings and 54% were ≥3.5 years. There was no difference in the average, annual antlered harvests during these 2 periods ($P > 0.75$). Our experience at Chesapeake Farms indicates white-tailed deer (*Odocoileus virginianus*) population structure can be affected through appropriate harvest management on relatively small areas.

2:10 p.m.

Applying Quality Deer Management to Gulf States Paper Corporation's Industrial Forestlands. Kevin A. McKinstry and Bill Baker – Westervelt Wildlife Services and John Roboski – Gulf States Paper Corporation

Gulf States Paper Corporation (GSPC) began co-managing timber and white-tailed deer (*Odocoileus virginianus*) in 1954 on their Alabama forestlands. During the following forty years management objectives changed from restocking deer to traditional deer management and, more recently, to quality deer management (QDM). Hunting access also changed during this period from permit hunting and daily fee hunting to hunting leases. GSPC forestland has been hunted exclusively by hunting leases since 1975. QDM was prescribed by GSPC wildlife biologists in conjunction with the Alabama Deer Management Assistance Program, which began in 1985. GSPC deer harvest data and lease records were summarized from 1986 to 2000, documenting changes in deer harvest under a quality deer management approach. During this period deer harvest has increased from one deer per 79 acres to one deer per 63 acres. Buck harvest increased from one buck per 187 acres to one buck per 167 acres. Doe harvest also increased from one doe per 256 acres to one doe per 101 acres. Buck quality improved by reducing the percentage of yearling bucks in the harvest from 57% to 30% and increasing the percentage of harvested ≥3.5 year old bucks from 8% to 24%. While lease acreage increased during this period, the average size of a hunting lease decreased slightly from 904 acres to 825 acres. The amount of acres per hunter remained relatively constant at a hunter per 60-65 acres. Quality deer management can be successfully implemented on industrial forestland with an average lease size of less than 1,000 acres.

2:30 p.m.

A Questionable Paradigm, the 1:1 Sex Ratio for Trophy Deer Management. Harry A. Jacobson – Mississippi State University

When asked what sex ratio is the optimum for achieving trophy deer management, most biologists are quick to state 1:1. I question this paradigm and suggest the optimum sex ratio for trophy management varies by reproductive recruitment, but lies somewhere above 1.5 bucks to does. Reasons include limited habitat carrying capacity in most environments, social biology and sexual competition for summer range, and higher natural mortality of males than females. Examples will be presented of five separate private management areas where trophy deer management has been a stated objective. Buck to doe ratios on these areas now range from a low of 1.6 bucks to does, to >3 bucks per doe. If habitat is limited and range carrying capacity can be prevented from occurring through hunter harvest, maximum sustained yield of bucks five years or older will always require sex ratios biased in favor of bucks. This simply can be explained by the observation does can normally replace themselves by reproductively active daughters within three to four years of birth. Bucks must reach five to six years of age to achieve their full potential to produce trophy antlers. The strategy of maintaining higher buck than doe ratios has the added advantages of requiring lower overall harvest of female deer to keep the population stable, and there appears to be good evidence overall visibility of deer per hour hunted also is increased. Seeing more deer per hour hunted, and in particular bucks, also can be expected to greatly increase hunter satisfaction.

2:50 p.m.

***Reproductive Success of Wild White-tailed Deer Males in South-Central Oklahoma. Randy W. DeYoung and Stephen Demarais – Mississippi State University, Kenneth L. Gee and Robert A. Gonzales – Samuel Roberts Noble Foundation, Rodney L. Honeycutt – Texas A&M University, and John H. Holman and Ann R. Harris – Samuel Roberts Noble Foundation**

There are many aspects of white-tailed deer (*Odocoileus virginianus*) reproductive ecology that remain undocumented, including male reproductive success. Reproductive behavior is typically researched through observation, which is often difficult or inadequate for many mammalian species, including large ungulates such as deer. Molecular genetic methods are becoming increasingly important to wildlife managers and scientists because molecular methods can provide conclusive insights into aspects of animal behavior that were previously difficult to investigate. We obtained blood or tissue from 435 wild white-tailed deer through capture, harvest, or shed antlers between 1992-2001 on a 3,163-acre (1,280-ha) management area in south-central Oklahoma. We assigned paternity for 109 of 197 fawns born between 1993-2000 using 17 microsatellite DNA loci. A total of 47 individual

males achieved reproductive success. Sixty fawns were assigned to 31 known-age (previously captured) males and 49 fawns were assigned to 16 males sampled by shed antlers only. Lifetime reproductive success was low for the majority of successful males (median=1; range: 1-9) and median age at first reproduction for successful males was 2.5 years. Maximum single-year reproductive success for an individual male was 6 fawns. Of the 60 fawns assigned to known-age sires, 58% were sired by males ≥3.5 years of age. Our data suggest that ≤20% of the male population achieved reproductive success in any single year. These data have important ramifications for deer management strategies that emphasize selective harvest or protection of individual males to affect physical characteristics of deer populations, such as antler quality.

Technical Session III

Moderator: Steve Shea, Wildlife Biologist –
St. Joe Timberland Company

3:35 p.m.

***Multiple Paternity in White-tailed Deer Revealed by DNA Microsatellites.**
Randy W. DeYoung and Stephen Demarais – Mississippi State University, Robert A. Gonzales – Samuel Roberts Noble Foundation, Rodney L. Honeycutt – Texas A&M University, and Kenneth L. Gee – Samuel Roberts Noble Foundation

Multiple paternity in single litters (siring of offspring by >1 male) has been documented in several taxa with different mating systems. However, information on occurrence of multiple paternity in ungulates is lacking. We used 19 DNA microsatellite markers to assign parentage in 41 litters of captive white-tailed deer (*Odocoileus virginianus*) born in 6 plural-male pens during 1997-1999. We detected multiple paternity in 7 of 27 multifarious litters occurring in 4 of 6 pens: 2 of 3 triplet litters and 5 of 24 twin litters. This is the first reported evidence of multiple paternity in single ungulate litters, which indicates some aspects of ungulate reproductive ecology are not well understood. The occurrence of multiple paternity in free-ranging ungulate litters would have implications for ungulate mating systems and reproductive strategies. Sex-linked microsatellite markers may provide a promising method for investigating female promiscuity in free-ranging ungulate populations where litter size is typically ≤2 offspring.

3:55 p.m.

Male Reproductive Physiology and Offspring Sex Ratio in Deer. Lisa I. Muller – University of Tennessee, Stephen Demarais and Randy W. DeYoung – Mississippi State University, H. David Guthrie and Glenn R. Welch – USDA Agricultural Research Service, and Terry Engelken – Mississippi State University

The primary sex ratio of the family Cervidae may vary at conception and/or birth. Researchers have debated the adaptive significance of sex ratios that differ from 50:50 (males:females). However, there is even less understanding of possible physiological mechanisms that may be involved. In mammals, the male is called the heterogametic sex because of the production of X- and Y-chromosome-bearing sperm (referred to simply as X- and Y-sperm). Male X- and Y- sperm ultimately control the sex of offspring; however, alteration of the fetal sex ratio could occur at different points of the reproductive process. The purpose of this experiment was to determine if the sex ratio of offspring produced by bucks of different ages and dominance status was related to the ratio of X- and Y-sperm from semen collected at 2 time points during the rut. Semen was collected from 19 captive male white-tailed deer (*Odocoileus virginianus*) housed at the Mississippi State University Deer Pens on 16-17 October 2000 and 14 bucks on 5 February 2001. The relative DNA content of sperm bearing the X- and Y- sex chromosomes and their distribution in ejaculates were determined using DNA fluorescence flow cytometry. The ratio of X- and Y-sperm (49.9: 50.1) did not differ significantly from a 50:50 ratio and did not differ among deer or between collection periods. Therefore, altered offspring sex ratios in cervids are most likely due to changes in female reproductive physiology. The mother's condition and dominance may control adaptive fetal sex ratios.

4:15 p.m.

***Factors Affecting Secondary Sex Ratio Bias in Free-Ranging White-tailed Deer. Bronson K. Strickland and Stephen Demarais – Mississippi State University and Larry Castle – Mississippi Department of Wildlife, Fisheries, and Parks**

Two prominent theories purport to explain variation in fetal sex ratios of white-tailed deer (*Odocoileus virginianus*). Trivers and Willard proposed maternal condition affects offspring sex ratio. Clark proposed competition for local resources influences offspring sex ratio. We analyzed data from spring "herd-health" collections conducted during 1978-2001 in Mississippi (n=2,371) to determine if deer in Mississippi conform to trends predicted by sex ratio theory. Herd-level analyses used mean population characteristics to explain offspring variation. Individual-level analyses used each animal's physical characteristics to develop models that

predict offspring sex ratio. For individual-level analyses we developed (*a priori*) 10 models that represent the mechanisms in the Trivers and Willard and local resource competition theories and used an information-theoretic approach based on Akaike's information criteria (AIC) to determine which model parameters most likely affected offspring sex ratio. Our data revealed fetal sex ratio is biased strongly towards males in Mississippi (1.4 M : 1.0 F); however, we found no overwhelming support for either sex-ratio theory. Population-level analyses indicated mean population condition and age did not affect mean sex ratio. Individual-level AIC results suggested that models which included a conception date parameter were the most reliable models of our candidate set. In Mississippi, adult females that conceive relatively late produce a preponderance of males (1.8 M : 1.0 F); whereas, those that conceive relatively early produce an offspring sex ratio at unity (1.0 M : 1.0 F).

4:35 p.m.

***Management Implications of Adaptive Fetal Sex Ratio Allocation in White-tailed Deer. Markus N. Peterson, Roel R. Lopez, and Nova J. Silvy – Texas A&M University**

Fetal sex ratios (FSR) have important implications for white-tailed deer (*Odocoileus virginianus*) management. Two hypotheses have been proposed to describe changes in FSR: (1) Verme suggested poor body condition would result in more males, and (2) Trivers and Willard suggested the opposite. In our study of endangered Key deer (*O. v. clavium*), the demographic response to environmental stress is dependent on FSR. Furthermore, male-biased FSR have been reported (2.6:1 to 1:1) for Key deer. Our objective was to evaluate FSR for Key deer and their permutations as suggested by both hypotheses. We developed a demographic, stochastic deer model using the program STELLA to address this objective. Model predictions were validated with actual survey data (1968-01). We found model predictions best fit empirical data when (1) a FSR closer to a 1:1 ratio was used, and (2) the expected population response was similar to that proposed by Verme. Model results suggest FSR allocation in the Key deer population would recover from disturbance in a fashion similar to other white-tailed deer populations (not more slowly due to a genetically-induced preponderance of male progeny). Further, our results contradict traditionally held and socially supported views regarding Key deer FSR.

4:55 p.m.

Density-dependent Reproductive Patterns in White-tailed Deer. Patrick D. Keyser – Westvaco Corporation and David C. Guynn, Jr. – Clemson University

Density-dependent reproductive patterns were assessed in nine exploited deer populations from across the Southeast that spanned a range of densities, physiographic provinces, and habitat qualities. All nine populations had large (265-1,036 animals/year), long-term (15-31 years) data sets from hunter-harvested deer. Population densities were estimated for each population by a combination of Downing and Wisconsin reconstructions. Density-dependence was assessed following a simple quadratic model of the form: Fawn Density = Adult Density – (Adult Density)^2. Models were also developed using Doe Density in place of Adult Density. Three additional populations were utilized for model validations. Six of nine populations exhibited significant density-dependence ($p < 0.02$) and two approached significance ($p=0.11$, 0.14). Time lags proved to be critical in detecting density-dependence with dramatic improvement with a one-year lag and further improvement with a two-year lag. Doe Density models were more sensitive than Adult Density models. Validations were highly significant for two of the populations ($r=0.81$, $p=0.00$; $r=0.96$, $p=0.000$) and marginally significant for the third ($r=0.45$, $p=0.10$). These results allowed for the development of population-specific stock-recruitment curves that allow managers to assess the relative density of herds and responses to population management strategies with reasonable precision. Existing paradigms of herd responses to exploitation seem to be confirmed by these results.

Tuesday, February 19, 2002

Technical Session IV

Moderator: Charles Ruth, Statewide Deer Project Supervisor – South Carolina Department of Natural Resources

8:05 a.m.

***Efficacy and Behavioral Observations for Does Treated with Prostaglandin $F_{2\alpha}$ During Mid-gestation. Meredith S. Tart, Robert J. Warren, and David A. Osborn – University of Georgia and Darrel J. Kesler – University of Illinois**

White-tailed deer (*Odocoileus virginianus*) have become overabundant in many urban and suburban areas. In some of these areas, lethal methods of population control may not be an option. Therefore, recent research has examined the effectiveness of fertility control methods, such as the contragestation agent, prostaglandin-$F_{2\alpha}$ ($PGF_{2\alpha}$). Previous research with deer has shown $PGF_{2\alpha}$ treatments during early gestation (35-65 days) were ineffective. Treatments administered during late gestation (112-154 days) were most effective, but many does demonstrated prolonged labor contractions and cannibalized their aborted fetuses. The objectives of our study were to determine the effectiveness of $PGF_{2\alpha}$ in terminating pregnancies during mid-gestation (70-105 days) and to observe behavior displayed by does after abortion. We treated 3 pregnant does with placebo biobullets (i.e., controls) and all 3 subsequently fawned. Two of 6 pregnant does treated with biobullets containing 25 mg $PGF_{2\alpha}$ during 70-88 days gestation aborted (33% efficacy) without prolonged contractions or cannibalism. Three of 3 pregnant does similarly treated during 89-105 days gestation aborted (100% efficacy) and only 1 of these cannibalized her fetus. Video monitoring of doe behavior revealed treated does displayed visible contractions not observed in control does, but contractions were much less pronounced than those observed in does treated during late gestation (112-154 days; previous research). Thus, mid-gestation treatments may provide optimum efficacy while avoiding behavioral complications (i.e., prolonged contractions and cannibalism).

8:25 a.m.

Contragestation in Captive White-tailed Deer: A Comparison of 3 Treatments for Inducing Abortions. David A. Osborn and Robert J. Warren – University of Georgia, Darrel J. Kesler – University of Illinois, and José Sulon and Jean-Francois Beckers – University of Liége

We tested the efficacy of biobullet treatments of prostaglandin $F_{2\alpha}$ ($PGF_{2\alpha}$), dexamethasone, and $PGF_{2\alpha}$ + dexamethasone for terminating the pregnancies of 11 captive white-tailed deer (*Odocoileus virginianus*) does. In addition, we used blood concentrations of ovine-pregnancy-associated glycoprotein (oPAG) and/or progesterone to verify the pregnancy status for each doe before treatment and 50 days post-treatment. Two of four does (50%) treated with $PGF_{2\alpha}$ and two of five does (40%) treated with dexamethasone delivered healthy twin fawns at full-term; however, lactation appeared to be inhibited in the dexamethasone-treated does. One of the dexamethasone-treated does had a stillbirth at full-term. One of two does (50%) treated with $PGF_{2\alpha}$ + dexamethasone delivered weak, twin fawns at full-term that died soon after birth. We observed evidence of abortion for only one doe (administered $PGF_{2\alpha}$ + dexamethasone). Four does that were pregnant before treatment (two $PGF_{2\alpha}$-treated and two $PGF_{2\alpha}$ + dexamethasone-treated) did not fawn, suggesting they resorbed or retained their fetuses. Although either abortifacient treatment might provide contragestation of white-tailed deer when administered remotely in a biobullet, our results suggest lactation is inhibited when does treated with dexamethasone or $PGF_{2\alpha}$ + dexamethasone do not abort their pregnancies. Because blood concentrations of progesterone and oPAG decline after fetal death in white-tailed deer, they might be useful for monitoring pregnancy status, especially when comparing samples at different stages of gestation.

8:45 a.m.

Application of Fertility Control for Urban Deer Management on Kiawah Island, South Carolina. James D. Jordan – Town of Kiawah Island, Robert J. Warren – University of Georgia, and Darrel J. Kesler - University of Illinois

Kiawah Island is a 7,907-acre (3,200-ha) coastal barrier island located near Charleston, SC. A white-tailed deer (*Odocoileus virginianus*) ecology study conducted on the island during 1997-1998 revealed the herd was healthy and reproductively fit (1.3 fawns/doe) with a density of about 104/mi^2 (40/km^2). Deer-vehicle collisions on the island averaged about 50 per year. A 1995 Town Ordinance prohibits the discharge of firearms; therefore, we designed a population-level experiment to test fertility control. We divided the island into 2 areas (treated and control). We treated all unmarked does seen in the treated area with 25 mg

prostaglandin $F_{2\alpha}$ delivered remotely via biobullets during January-March of 1999 (n=174), 2000 (n=150), and 2001 (n=147). Females in the control area were untreated. We collected a random sample of adult does from both areas at the conclusion of treatments each year to assess pregnancy rates. Pregnancy rates were 50% lower for does in the treated vs. control area during all 3 years. Spotlight surveys also showed a lower number of fawns in the treated vs. control area. We also noted a reduction in deer-vehicle collisions within the treated area. In 1997, before we began our treatments, the occurrence of road-killed deer was about equal in the treated and control areas (8 and 12, respectively). Conversely, since we began treating deer, the number of road-killed deer has decreased dramatically in the treated area (3 in 1999 and 4 in 2000), whereas it has remained unchanged in the control area (12 in 1999 and 12 in 2000). We are continuing treatments during winter 2002.

9:05 a.m.

***Efficacy of Carfentanil-Xylazine for Immobilization of White-tailed Deer.**
Brad F. Miller, Kent A. Adams, Lisa I. Muller, Timothy N. Storms, and Edward C. Ramsay – University of Tennessee and David A. Osborn, Robert J. Warren, and Karl V. Miller – University of Georgia

Research and management of deer often requires capture using chemical immobilization. The ideal capture drug must be safe, have a short induction time, wide safety margin, no long-term effects, small volume (facilitating remote delivery), and be completely reversible. We evaluated the use of an ultra-potent opioid, carfentanil citrate (carfentanil) with xylazine hydrochloride (xylazine) to immobilize captive white-tailed deer (*Odocoileus virginianus*). This drug combination has been shown to be safe and effective in other cervids. Twelve captive white-tailed deer (2 males and 2 females/group) were hand injected with 10 mg xylazine combined with one of three levels of carfentanil: 0.5 mg, 1.0 mg, and 1.5 mg. Calculated carfentanil dose ranged from 0.009 - 0.038 mg/kg body weight. Mean $\pm$ SD time in seconds for first noticeable effects occurred at 87.0 $\pm$ 16.4 for 0.5 mg carfentanil, 72.8 $\pm$ 8.8 for 1.0 mg carfentanil, and 81.5 $\pm$ 35.2 for 1.5 mg carfentanil. Mean $\pm$ SD immobilization time in seconds was 230.8 $\pm$ 46.9 for 0.5 mg carfentanil, 192.8 $\pm$ 45.9 for 1.0 mg carfentanil, and 190.5 $\pm$ 10.7 for 1.5 mg carfentanil. Immobilization was reversed using naltrexone (100 times the carfentanil dose) and yohimbine hydrochloride (10 mg). Rapid and complete reversal occurred for each group. Mean $\pm$ SD time in seconds until standing occurred at 124.0 $\pm$ 54.1 for 0.5 mg carfentanil, 65.3 $\pm$ 4.16 for 1.0 mg carfentanil, and 124.3 $\pm$ 16.9 for 1.5 mg carfentanil. Carfentanil/xylazine caused rapid induction, was quickly reversed, and provided effective, efficient immobilization of deer.

9:25 a.m.

Use of Dental Measurements to Estimate Age of Yearling White-tailed Deer. Stephen M. Shea – St. Joe Timberland Company and Robin Governo, M. Keith Causey, and Stephen S. Ditchkoff – Auburn University

Because breeding chronology of white-tailed deer (*Odocoileus virginianus*) is very asynchronous in the Southeast, we attempted to develop a model that would predict age of yearling deer using dental measurements. Tooth eruption data were collected from 39 and 41 known-aged captive deer from Florida and Alabama, respectively. Because eruption of the third molar occurs predictably during development, we predicted a model incorporating eruption of the third molar could be a useful tool for aging yearling deer. Using mandible impressions, we calculated length of dentition from the first premolar to the anterior portion of the third molar and an eruption value of the third molar by summing heights from the lingual gum-line to the crest of each of the three cusps. Length of dentition was a stronger predictor of age (r^2=0.93 and 0.92 for males and females, respectively) than eruption of the third molar (r^2=0.77 and 0.79 for males and females, respectively). The following equations predicted age (days) from dentition length (millimeters) for males and females, respectively: ln (age) = -4.34 + 2.45 * ln (dentition length), and ln (age) = -4.62 + 2.54 * ln (dentition length), where ln is the natural logarithm. These models predicted from 50-75% of test jaws to within 7 days of the actual age, while models using eruption of the third molar predicted <25% to within 7 days. These data suggest length of dentition can be used as an index to age in yearling deer. Data collected from hunter-harvested deer could provide large sample sizes that could be used to determine differences in breeding seasons and evaluate effects of antlerless harvest on conception dates.

9:45 a.m.

The Yearling Disadvantage in Alabama: Effect of Birth Date on Development. William N. Gray – Alabama Division of Wildlife and Freshwater Fisheries, Stephen S. Ditchkoff and M. Keith Causey – Auburn University, and Christopher W. Cook and Steven K. Watkins – Alabama Division of Wildlife and Freshwater Fisheries

It has been well documented in most wildlife species individuals with earlier parturition dates often have advantages over their late-born counterparts. This early parturition often leads to greater body size, increased survival, and increased reproductive success throughout life. This is true for white-tailed deer (*Odocoileus virginianus*) throughout most of their range. Late born fawns often do not have adequate time to increase body mass prior to winter and this penalty may be carried later into life. Most white-tailed deer in Alabama have a breeding season

(January, and in some cases, February) much later than surrounding states, which leads to many fawns being born in August and September. We collected antler and morphometric data from 761 yearling male white-tailed deer harvested from Wildlife Management Areas in Alabama during the 1998-1999 and 1999-2000 hunting seasons. Data suggested yearlings born late during the previous summer had less antler development than those born earlier during the previous summer. We also found late-born fawns had less body mass as yearlings than fawns born earlier in the summer. These data suggest genetic potential for antler development of most Alabama white-tailed deer cannot accurately be assessed in the yearling age class because of the variability and effects of birth date. In a more practical context, it may be inferred antler development in yearlings cannot effectively be used to predict future antler quality. Moreover, an effective selective harvest or "culling" strategy cannot be developed for yearling males throughout most of Alabama.

Technical Session V

Moderator: Kevin A. McKinstry, Project Director – Westervelt Wildlife Services

10:30 a.m.

***Evaluating the Effectiveness of Different Deer Population Estimation Techniques in the Central Appalachians. Christopher A. Langdon and John W. Edwards – West Virginia University, James M. Crum – West Virginia Division of Natural Resources, and W. Mark Ford – USDA Forest Service**

It is imperative deer herd managers adequately assess deer population densities to match an acceptable herd size with current or planned land management. Estimating deer density is especially critical in areas where deer numbers are high enough to potentially impact forest regeneration and agricultural production. Managers, however, are often limited in their ability to estimate deer populations by monetary, time, and labor constraints. They require estimation techniques that are efficient, accurate, applicable in different habitats, accepted by the public, and relatively low-cost. The goal of our study was to simultaneously evaluate three white-tailed deer (*Odocoileus virginianus*) population estimation methods on the Westvaco Ecosystem Research Forest, located in the Allegheny Highlands of east-central West Virginia. We estimated deer density by pellet-group counts, spotlight counts, and automated camera surveys during 4 sampling periods in 2000-01 on approximately 4,942 acres (2,000 ha) of forest and cutover areas. A marked deer population allowed us to derive mark-resight estimates using spotlighting and automated cameras. Density estimates ranged from 21.5 to 210.6 deer/mi^2 (8.3 to

70.2 deer/km^2); estimates were generally highest in the summer and lowest in the spring. Pellet group count estimates were inconsistent with those derived from other methods, as were spotlight mark-resight estimates calculated from few observations of marked deer. Automated camera surveys produced the most precise estimates, but were far more expensive than other methods; pellet group counts were the least precise, but also the least expensive method studied. Buck:doe and fawn:doe ratios observed by spotlighting and automated cameras were highest in the fall and winter, respectively. We present recommendations for further deer population estimation studies.

10:50 a.m.

A Comparison of Methods for Obtaining Perpendicular Distances From Non-linear Transects. Brian L. Pierce – Texas A&M University and John T. Baccus, Richard W. Manning, and Thomas R. Simpson – Southwest Texas State University

Spotlight strip transect sampling is used extensively for monitoring white-tailed deer (*Odocoileus virginianus*) populations throughout the United States. The current need for more precise information about the spatial scale of habitat use by deer has caused a re-examination of the spotlight method. We previously demonstrated the utility of a new spotlight line transect sampling method which is fast, spatially accurate, consistently obtains larger sample sizes per transect, and returns more information per sighting (count, composition, and spatial location) than traditional spotlight strip transect sampling method. Others have recently reported a similar application of distance theory to spotlight transect sampling, but these studies used an angular difference technique for obtaining the perpendicular distance measurements. We provide results from a survey of artificial deer in the Edwards Plateau region of Texas, where a population of known size and location was used to compare the 2 techniques under conditions typical of spotlight sampling throughout the region. Factorial analysis of variance was used to determine the affects of sample methodology, distance from transect, and survey group upon perpendicular distance measurement error. While our results indicate no significant ($P > 0.05$) difference between survey groups or distance estimates obtained using the 2 techniques, the error associated with each technique increased ($P < 0.001$) with perpendicular distance from the transect. Furthermore, the angular differences technique can be demonstrated to produce erroneous distance estimates along curved portions of the transect. Given the inherent advantages and disadvantages of each technique, we provide some basic guidelines for their application.

11:10 a.m.

***Censusing White-tailed Deer With Infrared-Triggered Cameras Placed at Soybean Feeders. Matthew A. Kearley and M. Keith Causey – Auburn University**

We attempted to census white-tailed deer (*Odocoileus virginianus*) populations at three study sites ((2,501 acres) 1,012 ha) in south Alabama over a two year period. Infrared-triggered cameras were placed at feeders that contained soybeans (*Glycine max*) and used to census deer populations at each study site as described by Jacobson et al. (1997). Feeders were spaced at a density of approximately 1/126 acres (1/42 ha) at 2 of the study sites, and 1/104 acres (1/51 ha) at the third study site. The number of photographs of non-target species at feeders was recorded, as well as the number of diurnal vs. nocturnal photographs of branch-antlered bucks. Deer of all ages and both sexes were photographed at feeders, although fawns rarely were photographed. Population estimates varied over time and among seasons, and may not accurately reflect actual populations at the three sites. Deer were photographed much more frequently than any other species and branch-antlered males were generally nocturnal in their use of soybean feeders.

11:30 a.m.

***Evaluation of Infrared-Triggered Camera Census Techniques Without the Use of Bait. Christopher E. Comer, Gino J. D'Angelo, Karl V. Miller, Cory Drennan, and David A. Osborn – University of Georgia and John C. Kilgo - USDA Forest Service**

Infrared-triggered cameras have been used to estimate population density of free-ranging white-tailed deer (*Odocoileus virginianus*). Jacobson and co-workers used cameras placed over bait stations in 161-acre (65-ha) blocks in Mississippi to derive reliable estimates of deer population size. However, placing and maintaining bait stations on a large study area can be labor-intensive and deer in some areas may not respond well to bait. Conceivably, bait stations also may attract deer from adjacent areas outside the study area, thereby yielding higher estimates. Our experience at the Savannah River Site near Aiken, SC, indicated deer did not respond well to corn and other bait. Therefore, we implemented an infrared-triggered camera survey technique using cameras placed along well-used trails, bedding areas, or other locations with high deer use. Cameras were placed for 6 nights at optimal locations within 64 69-acre (28-ha) grid cells superimposed over four study areas of 4,428 acres (1,792 ha) each. Twelve deer with numbered ear tags (6 does and 6 bucks) were present on one study area, allowing population size estimation by mark-recapture techniques for that area. We evaluated the effectiveness of the camera survey as an index by comparing the results to more

commonly used survey techniques, such as pellet group and track counts, as well as population reconstruction/estimation procedures. Preliminary results indicate camera survey indices are comparable to those obtained with the more established survey techniques.

11:50 a.m.

A Deer Guard to Prevent Access to Roadways: Part II. Roel R. Lopez and Nova J. Silvy – Texas A&M University and Phil Frank – National Key Deer Refuge

For a number of years, state and federal agencies have attempted to address Key deer (*Odocoileus virginianus clavium*) highway mortality on Big Pine Key, Florida. Highway losses account for nearly half of all deer mortality, with the majority of these occurring on US-1, the only highway linking the Keys to the mainland. If deer are to survive in a natural, self-sustaining population, methods to minimize road mortality should be addressed. A proposed alternative is the building of one or more deer underpasses, coupled with fences, to prevent deer access along undeveloped segments of US-1. Problems may occur at access roads where deer could possibly enter the highway. If trapped within these barriers, deer would be more susceptible to being killed on the roadway. Deer guards were proposed to solve this problem. There is little information, however, on the effectiveness of deer guards. A deer guard design (bridge grate) was tested in this study and results suggest the deer guard prevented the majority (>99%) of Key deer from reaching the feeding area. Following all the trials, only 1 adult female successfully crossed the guard in an 8 week period. The bridge grating material used in this study appeared to limit Key deer movement, however, it is recommended additional testing be conducted prior to final recommendations.

Technical Session VI

Moderator: John Morgan, Deer Management Section Leader – Florida Fish and Wildlife Conservation Commission

1:30 p.m.

***Supplemental Feeding of Free-Ranging White-tailed Deer With Raw Soybeans. Matthew A. Kearley and M. Keith Causey – Auburn University**

We evaluated the effectiveness of using raw soybeans (*Glycine max*) as a diet supplement for free-ranging white-tailed deer (*Odocoileus virginianus*). Soybeans were provided free choice in covered feeders on three study sites ((2,501 acre) 1,012

ha) in south Alabama and consumption was measured for two years. Harvest data were available from all three sites and changes in body weight subsequent to feeding soybeans were analyzed. Harvest data 3 years prior to providing soybeans were compared to harvest data subsequent to providing soybeans (4 years on site A, 2 years on sites B and C). Antler measurements were available from one site only and were analyzed for significant ($P<0.05$) changes subsequent to feeding soybeans. Consumption rates varied among study sites, but increased over time at all three sites. No significant changes were detected in male body weights, but mean body weights for adult males tended to increase at two study sites. Female body weights increased significantly ($P<.02$) at one site, declined ($P<.01$) at another, and did not change ($P<.05$) at the third site. There was no difference in antler measurements ($P<.05$) at site B. A study of longer duration would be more appropriate for detecting changes in body weights and antler measurements.

1:50 p.m.

***Spatiotemporal Characteristics of Female White-tailed Deer in the Central Appalachians of West Virginia. Benjamin R. Laseter, Tyler Campbell, David Osborn, and Karl V. Miller – University of Georgia and W. Mark Ford – USDA Forest Service**

Across their range, white-tailed deer (*Odocoileus virginianus*) form matrilineal groups, composed of older females and their female descendants. In migratory herds, researchers have used summer and winter range commonalities to delineate these matrilineal groups. In the central Appalachians of West Virginia, deer are nonmigratory and seasonal ranges are less discrete than in migratory herds. We hypothesized group members (as defined by degree of home range overlap) would show more affinity for one another during winter versus summer months. Furthermore, we expected decreases in home range size and number of deer per group in summer. To test these hypotheses, we examined radio-telemetry data collected from May 1999 to June 2001 for 63 female deer. Groups were delineated based on cluster analysis of degree of home range overlap (95% contour, Adaptive Kernel Method). Average home range size did not change seasonally ($P > 0.05$). Additionally, average female group size (number of deer/group) did not differ between seasons ($P > 0.05$). Our results suggest while biologically meaningful female groups likely exist in the central Appalachians, they cannot be defined via traditional approaches, such as shared seasonal ranges, alone.

2:10 p.m.

Stored Crop Loss Due to Deer Consumption. Kurt C. VerCauteron and Mike Pipas – USDA National Wildlife Research Center and Phil Peterson and Scott Beckerman – USDA Wildlife Services

Deer cause damage to agricultural crops each year. Agencies responsible for assessing crop damage need innovative and efficient methods for estimating these losses. To provide agencies with data upon which to base estimates of stored crop loss, we determined the quantity and value of stored crop consumed by deer during a single feeding. We collected deer as they approached or departed a site via sharpshooting and compared the amount of stored crop in the stomachs of the 2 groups. Disproving our hypothesis that deer arrived at the sites with empty stomachs and left with full stomachs, we determined the stomachs of deer leaving sites contained only 5 oz (143 g) more food than those of deer approaching the sites. Results suggest deer were obtaining the majority of their food from other sources and damage was more perceived than actual.

2:30 p.m.

***Short-Term Understory Vegetation Responses to Deer Exclosures at Arkansas Post National Memorial. Christopher L. Watt and Philip A. Tappe – University of Arkansas – Monticello**

Arkansas Post National Memorial (ARPO), a unit of the National Park Service located in east-central Arkansas, supports a protected population of white-tailed deer (*Odocoileus virginianus*) at densities often exceeding a deer per 5 acres. To investigate potential impacts of deer herbivory on understory vegetation at ARPO, four 16.4 x16.4 ft (5.0 x 5.0 m) deer-proof exclosures, along with paired, unfenced plots, were placed within each of five vegetation types (oak/hickory, oak/pine, oak/sweetgum, sweetgum, tall grass prairie) in June 1999. Vegetation in a randomly selected 10.8-ft^2 (1-m^2) quadrat within each exclosure and unfenced plot was clipped once per month from June through October during 2000. Dry biomass values were derived for species groups (trees, shrubs, grasses and sedges, vines, and forbs) and for individual plant families. Mean dry biomass was compared between fenced and unfenced plots by month within each vegetation type. Fenced plots had higher tree biomass in the oak/hickory and sweetgum types, higher grass and sedge biomass in the oak/pine and sweetgum types, and higher forb biomass in the tall grass prairie. Additionally, 8 families had higher biomass in fenced plots versus unfenced plots: Compositae, Cyperaceae, and Fagaceae in the oak/pine and sweetgum types; Bignoneaceae and Caprofoliaceae in the sweetgum type; Anacardiaceae in the oak/hickory type; Liliaceae in the oak/hickory and sweetgum types; and Ulmaceae in the oak/hickory, sweetgum, and tallgrass types. Results

indicate deer exclosures resulted in significant, specific changes in understory biomass after only one growing season. Continued monitoring will provide information on potential long-term effects of deer exclosures on understory vegetation.

Technical Session VII

Moderator: Donald E. Wood, Wildlife Biologist – Mead Corporation

3:15 p.m.

The National Wildlife Research Center's Efforts to Control Bovine Tuberculosis. Kurt C. VerCauteron, Tom DeLiberto, and Gary Witmer – USDA National Wildlife Research Center

The National Wildlife Research Center (NWRC) is the research branch of USDA/APHIS/Wildlife Services. In cooperation with other federal and state agencies and universities, NWRC is putting forth substantial research effort to develop strategies for controlling bovine tuberculosis (TB). The foci of our efforts are in Michigan, where white-tailed deer (*Odocoileus virginianus*) have been shown to be transmitting the disease to cattle. Michigan lost it's Accredited-Free Status because of this and can no longer ship cattle out of the state, resulting in large economic costs for the state and the livestock industry. The NWRC is concentrating on 5 research areas to address TB, including (1) defining species susceptibility, transmission routes, and interactions between wildlife species, and wildlife and cattle; (2) evaluating sentinel species, such as coyotes (*Canis latrans*), to monitor the prevalence and spread of TB; (3) developing effective and economical barriers to wildlife movement, to reduce interaction of wildlife and cattle; (4) modeling the ecology of TB in wildlife and cattle in Michigan; and (5) developing vaccines and delivery systems for free-ranging wildlife. Our presentation will summarize NWRC's efforts and update our progress.

3:35 p.m.

Hemorrhagic Disease in White-tailed Deer: Our Current Understanding of Risk. David E. Stallknecht and E. W. Howerth – University of Georgia and J. K. Gaydos – University of California-Davis

Hemorrhagic disease, caused by related viruses in the bluetongue and epizootic hemorrhagic diseases serogroups (*Orbivirus*, Reoviridae), is the most important viral disease affecting white-tailed deer (*Odocoileus virginianus*) in North America.

Clinically the disease in white-tailed deer is extremely variable, ranging from acute death to inapparent infection. Although this clinical variation cannot be fully explained, it appears to result from a combination of factors related to vector distribution, herd immunity, and innate resistance. Based on these variables, it is possible to predict long-term risks associated with these viruses. In general, clinical severity follows a latitudinal gradient. In southern latitudes, increased infection rates, characterized by a detectable herd immunity, are associated with less severe disease. Disease, when detected in such areas is usually associated with hoof and rumen lesions and most animals appear to recover. In areas of sporadic transmission, as occurs in northern latitudes where herd immunity is low, large-scale mortality events are more common. In extreme southern latitudes and in arid areas in the western United States where viral transmission occurs annually, disease is rarely reported, and in such areas, white-tailed deer may be genetically resistant to these viruses. Although severity and temporal patterns of disease events can be predicted, estimates of population impacts still are problematic. Severe but short-term population impacts have been documented in free-ranging populations, but until these are fully understood a true understanding of risk associated with hemorrhagic disease outbreaks cannot be achieved.

3:55 p.m.

White-tailed Deer and Tickborne Zoonoses: Emerging Public Health Issues and Deer Management. William R. Davidson, David E. Stallknecht, and Susan E. Little – University of Georgia

Six previously unknown tickborne zoonoses including babeiosis (*Babesia microti*), Lyme disease (*Borellia burgdorferi*), monocytotropic ehrlichiosis (*Ehrlichia chaffeensis*), two distinct granulocytotropic ehrlichioses (*E. phagocytophila* and *E. ewingii*), and southern-tick-associated-rash-illness (*B. lonestari*) have emerged in the United States since the 1970s. In the eastern United States, these diseases are transmitted by either the black-legged tick (*Ixodes scapularis*) or the lone star tick (*Amblyomma americanum*). Both of these ticks are ecologically dependent upon white-tailed deer (*Odocoileus virginianus*) as a host for one or more tick life stage, and in some cases (*e.g. E. chaffeensis*) deer also are known to serve as vertebrate reservoirs of the pathogens. The direct and indirect links between deer and this array of tickborne zoonoses will focus a new public health component to deer management decision processes. Natural resource managers need to be cognizant of these new public health issues and resource managers should develop strategies to integrate input from public health agencies where appropriate, in order to ensure scientifically sound deer management practices.

4:15 p.m.

Fate of Rehabilitated, Vasectomized Buck Fawns Released on Ossabaw Island, Georgia. John W. Bowers and Dan L. Forster – Georgia Department of Natural Resources

In 1992, a long-term study was initiated to validate the technique of estimating white-tailed deer (*Odocoileus virginianus*) age using tooth wear and replacement from known-aged deer. To this end, up to 16 buck fawns were obtained annually from permitted deer rehabilitators in Georgia for release into a closed and hunted population on Ossabaw Island, Georgia. Buck fawns were vasectomized to avoid genetic pollution, tagged with Monel ear and Passive Integrated Transponder (PIT) tags, and released (hard-release) at 12-16 weeks of age. Suitability for release was determined by the rehabilitator and varied among individuals. From 1992-1994, forty-three (43) buck fawns were released with 8 being harvested within three months post-release, only one was recovered in the harvest at >1 year-old. To further evaluate short-term survival, 10 of 17 fawns were fitted with break-away radio collars equipped with a mortality switch in 1995. Signals were monitored once per week for mortality until the collar was recovered. Sixty percent (n=10) of radio-collared deer died within 3 weeks and 1 at 8 weeks post-release. Three fawns survived a minimum of 3 months post-release, although one was legally harvested that same year. To date, a total of 60 fawns has been hard-released, with only 2 being recovered as yearlings and none older than 1.5 years of age. These results indicate rehabilitated buck fawns exhibit low survival under hard-release conditions into unfamiliar coastal environments.

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 75-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. During this time 65-70% of the annual harvest were bucks. Age structure of harvested bucks is typically young, with the average age being less than 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 were allowed to 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 again 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 was also 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 should provide the framework many landowners, hunting clubs, etc. need to manage their properties as they wish, without having to enroll in the DMP. It also is hoped this increase in either-sex hunting opportunities will help stabilize expanding deer herds and correct out of balance sex ratios found in many parts of the state.

ARKANSAS

Arkansas is a very diverse state in terms of physical and biotic characteristics. In terms of topography, geological 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 Coast 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, shortleaf pine-upland hardwood, loblolly pine-bottomland 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 the 1950's, with a large number of record book bucks harvested in several areas of the state. 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. The highest populations of deer and heaviest hunting pressure occur in the West Gulf Coastal Plain division. The herd in this region is characterized by high numbers of antlerless deer and poor antler development. The largest deer and best quality deer occur in portions of the Mississippi Alluvial Plain division. Population levels in the Ozark and Ouachita Mountain divisions are classed as low to moderate with high densities in localized, highly protected areas. Age-class distribution, especially for bucks, and herd-quality indices are superior to those in the West Gulf Coastal Plain division.

Deer management zones are used for statewide herd management. Antlerless harvest is accomplished with the use of either-sex primitive weapons and modern firearms hunting seasons. Management efforts are directed toward increasing the antlerless harvest and reducing the antlered harvest. A more conservative antlerless harvest strategy is being taken in portions of the state where lower deer populations occur. For the 1998 deer season, Arkansas implemented a three-point rule statewide except for some wildlife management areas and federal refuges. Legal bucks must have at least three points (one inch or longer) on at least one antler. This regulation was implemented to reduce the harvest of young bucks and improve the antlered to antlerless ratios in the state.

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%), fresh water marshes (5.6%), prairies (5.2%), sand pine-scrub oak ridges (1.5%), and various mixtures or other types including tidal marsh (3.5%).

In the 1800's and early 1900's, 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 1920's to 1930's, 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. However, in some areas of the Southeast and on the Seminole Indian Reservation in south Florida, the cattle fever tick was eradicated without the slaughtering of deer. This raised serious doubts that the slaughter of deer was necessary. 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 in 1958.

Since the 1930's, 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 1960's. Today, the Florida Game and Fresh Water Fish Commission allows either-sex archery hunting, has a lottery drawing for antlerless deer permits on most wildlife management areas, and issues antlerless deer permits to private lands in addition to two days of antlerless deer hunting during the gun season.

GEORGIA

Georgia's deer population (as estimated by computer models) has declined from 1.5 million in 1991-92 to 1.3 million in 1997-98. This decline has been by design due to steadily increasing opportunities for either-sex harvesting since the 1990-91 hunting season. The reduction of either-sex hunting opportunities during the early and mid 1980's resulted in a herd expansion that pushed the population from approximately 500,000 in 1981-82 to almost over million in 1986-87. This expansion continued though 1991-92, even though either-sex hunting opportunities were increased annually. The increased removal of does began to decrease the population in 1992-93 through the present.

Georgia's Piedmont physiographic province is the predominant physiographic province of the northern deer zone as well as the more productive habitat. Prior to the 1987-88 hunting season, the Piedmont province supported approximately 600,000 deer. This province also supports the most intense hunting pressure due to its proximity to the highest hunter populations. It was apparent that if the statewide population was to be reduced, the Piedmont was the appropriate starting place. To affect this reduction, the number of either-sex hunting days was increased and now stands at 28 in most counties. In addition, prior to the 1991-92 hunting season, the statewide bag limit was increased from three to five deer with no more than two antlered bucks. Either-sex days began increasing in the Coastal Plain province in the 1990-91 season and now stands at 53 in most counties. Due to the lower hunter numbers, a reduction in the Coastal Plain deer populations has not been easily accomplished.

As one might expect, this increase in either-sex hunting days and bag limit resulted in a steady increase in the harvest of does. Statewide, the percentage of does in the harvest has increased from an average of 27.4% annually during the 1980's to over 54% in 1997. As a result, the population has been reduced somewhat, but the 1990 goal of 1 million has not yet been reached.

These efforts to reduce the population are continuing; however, they have presented a new challenge not previously faced by wildlife agencies in the southeast B managing a declining deer population. The preferred method for the future would be to provide the same either-sex hunting opportunities and educate the hunters to use this framework to manage the deer populations on their respective hunting lands as needed. To accomplish such a goal will require some innovative educational programs, since most of the hunters are accustomed to harvesting deer from high deer populations.

KENTUCKY

The forest regions of Kentucky include the Mixed Mesophytic Forest, Western Mesophytic Forest and Southeastern Evergreen Forest. Divisions within the Mixed Mesophytic Forest include the Cumberland Mountains and the Cumberland and Allegheny plateaus. The Western Mesophytic Region divisions include the Bluegrass section, Hill section, Mississippian Plateau section, and the Mississippian Embayment. The Southeastern Evergreen Region includes the Mississippi Alluvial Plain on the western most tip of Kentucky.

Ninety-five percent of Kentucky is in private ownership. The average farm size is 185 acres and there are about 210,000 farm owners in the state. The best deer habitat is in the Western Mesophytic Forest, which comprises the western two thirds of the state.

Kentucky's deer restoration program began in 1948, but most stocking occurred during the 1960 to 1970 period. The deer population has risen from an estimated 2,000 in 1945 to a current prepartum number of 410,000. Deer harvests have reached new records for each of the past 14 years. The deer herd is managed on a doe day system and female deer make up 36 percent of the total harvest. Almost all antlerless harvest come from the Western Mesophytic Region of the state. Harvests declined in 1992 and 1993, primarily due to herds being reduced by heavy doe hunting. Deer herds are continuing to be allowed to grow in the Mixed Mesophytic Region and have yet to reach carrying capacity of the habitat.

The largest problem in managing Kentucky's deer herd is conflict with agricultural interests. Deer herds in the western two-thirds of the state are currently being held at levels well below carrying capacity of the habitat. Herds in this region cannot be increased because of landowner intolerance of deer damage. This will remain the case unless attitudes change or leasing makes deer more valuable to landowners.

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, and 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 today, and the present population is approaching one million animals.

The Louisiana deer story is similar to that of most other 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 sound deer management programs. In the late 70s, LDWF began to assist hunting clubs and landowners with their deer management problems and needs.

The Wildlife Division of LDWF is divided into seven game districts. The wildlife biologists in each district are responsible for management of the herds on public and private lands within their district. The Department's wildlife management areas provide excellent deer hunting opportunities due to sound herd and habitat management. During the 1993 either-sex gun season on these WMA's, there were 38,335 hunter efforts, resulting in a harvest of 3,016 deer (1 deer per 12 hunter efforts). These areas are also open for additional days of deer hunting with bow and arrow, black powder, and bucks-only hunting with modern firearms. The Deer Management Assistance Program (DMAP) is available to hunting clubs and private landowners who desire a higher level of deer management. In 1993, nine hundred ninety-four cooperators enrolled 1,942,777 acres of land in this program. This generated $123,079 for the Department from enrollment fees.

While the success of the wildlife management programs and DMAP have demonstrated that proper deer management is effective, there is still more work to be accomplished. An example of this is the need for further development of either-sex hunting opportunities. Progress is being made along these lines because, in 1994, a regulation was passed that allows hunters to harvest one antlerless deer and one antlered buck per day on doe days. The daily limit had been one deer per day. It is hoped that this regulation will encourage hunters to shoot a doe since they would often pass them up in hope of seeing and shooting a buck.

MARYLAND

Maryland, often referred to as "America in Miniature", has four physiographic regions - the Coastal Plain, Piedmont, Ridge & Valley, and the Appalachian Plateau. The land uses vary from northern hardwood timber in the extreme western portion of the state to the loblolly pine forest in the Chesapeake Bay and coastal region. Central, southern and eastern sections of the state support agricultural uses. Forests cover 43 percent of the state with agricultural lands comprising 38 percent.

Maryland's deer population survived only in the remote mountain sections by 1900. Habitat destruction and uncontrolled hunting had eliminated deer from the rest of the state. Restocking deer began in the early 1900s when deer from Pennsylvania, Michigan and Wisconsin were released. Deer restocking accelerated after World War II with deer from the Aberdeen Proving Grounds (Maryland) being introduced throughout the state.

Western Maryland experienced its first deer season in the 1920s. With mandatory check stations instituted in 1931 thirty-one deer were reported taken in the Western Maryland counties of Allegany and Garrett. The first antlerless season was held in 1957 and by 1960 deer hunting occurred state-wide (except for Montgomery County).

Maryland's current deer seasons are as follows: Archery - Middle of September through end of January; Modern Firearm - Saturday after Thanksgiving through second Saturday of December ; Muzzleloader - three days in late October and two weeks covering late December and early January. One Saturday in mid-November is set aside for youth firearm deer hunting only. Antlerless permits are required only in three western counties. Antlerless permits are issued in these counties due to intense hunting pressure with the potential of an extremely high harvest.

Maryland's human population totals 5.1 million. Fifteen percent of the state is classified as development. This developed section of Maryland has expanded by 38 percent during the past 30 years. This section contains the most rapidly growing deer population. Conflicts between people and deer continue to proliferate within this area.

Maryland recently completed a statewide deer plan. The primary goal is to maintain healthy deer populations as a valuable component of Maryland's ecosystems, stabilize deer population numbers throughout the state, then gradually adjust populations to bring them into acceptable ranges for the social and environmental conditions of individual communities. The primary strategies are as follows: make deer population management decisions, including target population levels and selection of management options, based upon local management units, in consultation with local communities; directly support research and expanded application of non-lethal deer control methods, including birth control and behavior modification; change Maryland's hunting laws to give the Department greater flexibility in increasing deer bag limits, particularly antlerless deer; establish and use procedures that can safely and efficiently remove deer from specific areas through means other than regulated hunting.

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 percent, 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 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 1998 pre-season population estimate was 950,000 deer. During the 1999-00 hunting season, either-sex regulations in about two-thirds of the state 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 shortgrass 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 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 200 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, September 1, or September 15 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. The 18-county Piedmont and Mountains deer season begins on September 15 and October 1 respectively and ends on January 1. There are liberal archery and/or primitive weapons seasons in all areas. Neither dog hunting or baiting is allowed in the upstate.

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. However, many coastal game zones have no season or daily limit on 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 set the last two days 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 3,000 properties encompassing over 4 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 can not be used on properties already enrolled in the ADQP. Currently, over 30,000 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 nearly 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 composed 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. Deer habitat quality consequently 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 are less abundant, although they are increasing rapidly. The habitat in the mountainous eastern portion of the state is less productive than the rest of the state, and deer herds in these areas will probably not reach the densities that have been achieved in middle and western Tennessee.

Tennessee is blessed with abundant public hunting opportunity. Over 2,000,000 acres of land is available for hunting by the general public. About 1.3 million of these acres are managed by state and federal agencies, and provide a variety of hunting opportunities. Another 700,000 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 ($12-$25).

The history of Tennessee's deer herd is similar to that of other states. The low point in numbers of deer occurred at the turn of the century, when it is estimated that the herd numbered less than 2,000 deer. 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 activities, most deer were obtained from out of state, with the states of North Carolina, Texas, and Wisconsin providing the bulk of the deer that later served as in-state sources for subsequent stocking. 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 to be approximately 829,000. The deer harvest has grown accordingly, from 113 in 1949 to over 150,341 in 1997.

Deer management in Tennessee is conducted on a unit basis, with 2 major 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 desired doe harvests are determined. Doe harvests are accomplished through the issuance of quota permits allocated by drawing. Since 1975, the antlerless harvest in Tennessee has increased from 23% to over 41% of the total harvest in 1997.

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 has a diverse landscape comprised of 10 ecological regions. These regions range from the dense pine and hardwood forests of the Pineywoods to the arid and mountainous Trans Pecos region in the western part of the State, much of which is unoccupied by white-tailed deer. Much of the Rolling Plains and High Plains regions, where livestock grazing and irrigated farming dominate, are also unpopulated or sparsely populated by white-tailed deer. Other regions include the hardwood forests and savannah of the Post Oak region and the oak and mesquite savannah of the Cross Timbers and Prairies. The Gulf Prairies and Marshes consist of a slowly drained level plain along the Texas Coast, and the gently rolling to moderately rough Blackland Prairies have significant agricultural development. The region of the State most notorious for dense populations of white-tailed deer is the limestone and granite Edwards Plateau, often referred to as the "Hill Country". The South Texas Plains region, 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 Rio Grande, and is most noted for widespread intensive deer management on large acreages.

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 caused the decline of the species by the late 1800's. Public concern prompted a series of protective measures. A five-month closed season was enacted in 1881, and the first bag limit was established in 1903 at 6 bucks. Six game wardens were hired in 1919 to patrol the entire State. Deer increased dramatically by the 1930's due to protective regulations, law enforcement, invasion of woody plants into the prairies, and restocking efforts.

White-tailed deer have expanded their range to over 82 million acres of the State with a population estimate of just over 3.5 million in the last several years. Total harvest has been on the increase since 1996, with the 2000-2001 harvest just over 424,000 animals, 59% of which were antlered deer.

A major problem persists with deer-human conflicts in many suburban areas. Private trappers are permitted to relocate deer in efforts to alleviate some of these problems. Bag limits and seasons have been liberalized to deal with the burgeoning deer population, and to pique hunter interest.

Research and management experience in Texas continues to demonstrate the utility of selective harvest in producing bucks with superior antlers. Targeting deer with the smallest antlers as early as possible helps to ensure larger bucks at maturity. Currently, several of the State's wildlife management areas emphasize the harvest of bucks with fewer antler points through various regulations. Selective harvest strategies that apply harvest pressure to "low-end bucks" are becoming more prominent among landowners and hunters as educational efforts increase through Texas Parks and Wildlife (TPW) programs.

In addition to the wide array of county regulations used to achieve antlerless deer harvest through the use of either-sex hunting days, TPW offers additional anterless deer permits through different programs. Landowner Assisted Management Permitting System (LAMPS) antlerless deer permits are available in 53 east Texas counties. The Program issues over 20,000 permits to 3,700 properties covering over 2.7 million acres. Properties

receiving LAMPS permits are not required to have a Wildlife Management Plan (WMP). LAMPS permits are issued based on county deer herd data and the relative quality of deer habitat as reported on the application. Managed Lands Deer Permits (MLDP) are issued on over 1,700 tracts of land encompassing approximately 5 million acres across the State. A Wildlife Management Plan approved by TPW personnel is required for the issuance of MLDP's. There are three different levels of MLDP's, with the least restrictive level applying to antlerless deer only. The more advanced levels include buck permits with increased bag limits and seasons for both sexes. The advanced levels of MLDP's require a higher degree of compliance as outlined in the WMP.

Each WMP not only addresses deer harvest recommendations, but also recommends appropriate livestock stocking rates, rotational grazing, prescribed burning and timber management strategies as well as other habitat enhancement practices. Ultimately, overall impact to the native plant community is the deciding factor in determining the degree of compliance in a WMP. If landowners are expected to remain at the more advanced MLDP levels, habitat conditions must be improving or remain in a suitable condition over time.

Recent years have seen the growth of wildlife management cooperatives in certain parts of the State. Often, these cooperatives form as a result of failed efforts to manage for white-tailed deer on small tracts of land. With the increased parceling of land imminent, these cooperatives will prove a necessity for managing deer in the future.

VIRGINIA

The statewide deer harvest during the 2000 hunting season was 187,878 (95,399 antlered males, 18,678 male fawns, 70,588 females (38.2%) and 3,213 deer of unrecorded sex). The archery and muzzleloading harvest were 17,323 (9%) and 46,848 (25%) respectively. Harvest data in Virginia represent an actual known minimum count. Data are obtained through mandatory tagging and subsequent checking at one of about 1,300 check stations located statewide. The mandatory check station system has been in operation continuously since 1947 and is operated by volunteers.

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 third Monday in November. East of the Blue Ridge Mountains, the firearms season runs through the first Saturday in January (42 days). West of the Blue Ridge and in the southwestern Piedmont, the firearms season is 12 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, 3 per season, one 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, 4 per season, one 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 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 2000 season, there were 612 DMAP cooperators encompassing 1,228,000 acres in 88 counties. These DMAP cooperators were issued a total of 19,255 antlerless tags and reported a total deer harvest of 16,704. Biological data is collected from all these animals. Also during the 2000 deer season, there were 710 DCAP cooperators comprising 191,000 acres. These DCAP cooperators were issued 6,780 antlerless tags and reported a harvest of 1,844 antlerless DCAP deer.

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 vast majority of the Commonwealth of Virginia, current deer management

objectives call for the deer herd(s) to be stabilized at their current level. Stable antlered male harvest levels and trends appear to indicate that deer regulations/seasons have been successful in controlling herd growth.

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. West Virginia's deer harvest totaled 25,863 animals in 1981 under archery, antlerless permit, and bucks-only regulations. In 2001, West Virginia sportsmen harvested 215,777 deer under a 76 day archery season, 13-day bucks-only, 12-day antlerless , 3-day Youth Hunter deer season, and 6-day muzzleloader seasons. In 1970, the bag limit was 2 deer. Today, resident hunters may take as many as 8 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 Deer Harvest Summaries 2000-2001

State	Land Area (sq. mi)	Deer Habitat		Percent Forested	Deer Range Unoccupied	% Land Area Public Hunting	2000-2001 Harvest		
		(sq. mi)	(% Total)				Male	Female	Total
AL	51,628	48,014	93	66	0	5	235,520	243,180	478,700
AR	52,609	52,609	85	53	0	12	92,744	88,689	181,433
FL	51,628	29,280	50	45	0	16	100,243	39,434	139,677
GA	57,800	37,181	64	64	0	6	181,300	220,700	402,000
KY	40,395	39,654	97	59	0	9	68,103	70,037	138,140
LA	41,406	26,562	64	52	0	4	134,640	110,160	244,800
MD	9,837	8,766	89	43	0	4	49,535	35,241	84,776
MO	69,561	21,396	31	31	0	4	138,486	104,261	244,053
MS	47,296	31,250	66	66	0	6	142,027[1]	133,565[1]	276,361[1]
NC	48,794	36,798	75	62	0	6	129,412	83,067	212,479
OK	69,919	37,425	54	19	0	2	61,046	41,054	102,100
SC	30,207	21,920	73	63	0	7	160,000	140,000	300,000
TN	42,246	25,770	61	49	0	9	93,885	61,638	155,523
TX	261,914	129,592	49	40	<3	<2	249,128	174,902	424,030
VA	39,682	31,479	79	63	0	7	114,077	70,588	187,878
WV	24,064	22,889	95	79	0	9	121,107	71,447	192,944

Table 1. Continued

State	Harvest/mi² Occupied Habitat	Method of Data Collection[2]	Estimated Pre-season Population	Length of Season (Days)			Method for Setting Seasons[3]	% Land Area Open to Dog Hunting
				Archery	Black Powder	Firearms		
AL	10.1	1,2,3	1,750,000	110	17	75	1, 2	70
AR	3.5	1,3	1,000,000	152	25	40	1, 2	81
FL	4.7	2	N/A	30	3	72	1, 2	20
GA	10.8	1,3,4	1,300,000	108	7	70 – 80	1,2,3	10
KY	3.5	1,3,4	750,000	122	9	10 – 16	1,2	0
LA	9.2	1,2,3	1,000,000	123	14	60	1,2,3	80
MD	9.7	1,2,3,4	225,000	87	18	13	1,2	0
MO	11.4	1,2,4	1,000,000	98	9	15	1,2	0
MS	5.8	1,2,3	1,500,000	62	14	60	1,2,3	93
NC	5.8	1,2,3,4	1,100,000	24 – 54	6	18 – 67	1,2,3	53
OK	2.7	1,3	475,000	83	9	9	1,2	0
SC	13.7	1,2,3	1,000,000	12	10	70 – 140	1,2,3	60
TN	6.0	1,4	990,000	52	14	39	1,2,3	0
TX	3.3	2,3	3,543,763	30	9	16 – 128	1,2	0
VA	6.0	1,2,3,4	900,000	37 – 43	12 – 24	12 – 42	1,2	55
WV	8.4	1	895,000	67	18	18	1,2,3	0

Table 1. Continued

State	No. Deer Hunters	5-Year Trend	Hunting License Fees		% Hunting Success		Typical Fine Illegal Deer	Avg. Leasing Fees/Acre
			Resident	Non-Resident	Archery	Firearms		
AL	218,400	Stable	$16	$202	25	60	$150 - 600	$4 – 15
AR	250,000	Stable	$10.50 - 25	$100 - 225	N/A	N/A	$150 – 1,000	$3 – 6
FL	N/A	Stable	$12	$151	N/A	N/A	$250 – 500	$2 – 5
GA	294,619	Down	$19	$177	27	57	$500	$5 – 10
KY	271,000	Stable	$33.50	$116	25	57	$350	N/A
LA	171,900	Stable	$29 – 50	$225 – 300	31	59	$500	$3 – 30
MD	80,357	Down	$24.50	$120.50	50	60	$500	$5 – 35
MO	425,000	Stable	$15	$125	20	40	$100 – 250	$2 – 5
MS	160,000	Down	$17 – 32	$60 – 300	40	63	$150	$2 – 5
NC	235,000	Stable	$30	$120	N/A	49	$200 – 800	$2 – 6
OK	173,021	Stable	$12.50	$201	16	40	$500 – 1,000	$2 – 5
SC	140,000	Stable	$20	$114 – 189	N/A	59	$200	$4 – 10+
TN	228,405	Stable	$39	$156	23	43	$50 – 500	$4.50
TX	548,537	Down	$19	$250	18	60	$25 – 500	$5 – 7
VA	264,937	Down	$25 – 50	$122 – 174	28	48	$50 – 850	$4
WV	343,000	Stable	$25	$110	22	47	$282 - 562	$1 – 5

Table 1. Continued

State	Mandatory Hunter Education	Number Fatal Hunting Accidents		Mandatory Blaze Orange	Handguns Permitted	Crossbows Permitted	Drugged Arrows Permitted	Highway Kill (Minimum)
		All	Deer					
AL	Yes	4	4	Yes	Yes	Handicap	No	10,000
AR	Yes	4	4	Yes	Yes	Yes	No	8,500
FL	Yes	0	0	Yes	Yes	Yes	No	N/A
GA	Yes	6	5	Yes	Yes	No	No	50,000
KY	Yes	5	3	Yes	Yes	Yes	No	4,000
LA	Yes	N/A	0	Yes	Yes	Handicap & >60	No	2,500
MD	Yes	1	1	Yes	Yes	Handicap	No	4,364
MO	Yes	3	2	Yes	Yes	Yes – Firearms	No	8,143
MS	Yes	5	4	Yes	Yes	Handicap & ≥65	Yes	7,500
NC	Yes	5	3	Yes	Yes	Handicap	No	5,000 – 6,000
OK	Yes	Unknown	0	Yes	Yes	Handicap	No	Unknown
SC	Yes	3	2	Yes (18 co.)	Yes	Yes	Yes (28 co.)	3,576
TN	Yes	2	1	Yes	Yes	Handicap	No	N/A
TX	Yes	8	5	WMA's only	Yes	Yes	No	N/A
VA	Yes	6	5	Yes	Yes	Handicap	No	N/A
WV	Yes	2	1	Yes	Yes	No	No	13,954

[1] 1998-1999 Numbers
[2] 1-Check Station; 2-Mail Survey; 3-Jawbone Collection; 4-Computer Models; 5-Telephone Survey
[3] 1-Harvest and Biological; 2-Departmental/Commission Regulatory; 3-Legislative[4]

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2002 SOUTHEAST DEER STUDY GROUP
COMMITTEE ASSIGNMENTS

CO-CHAIRPERSONS
Chris Cook, Bill Gray, Keith Guyse, and David Nelson

PROGRAM AND AGENDA
Chris Cook (Chair), Bill Gray, and David Nelson

REGISTRATION
Keith Guyse (Chair) and Stacey Norris

HOTEL ARRANGEMENTS
Chris Cook (Chair), Bill Gray, and Charles Sharp

FUND RAISING
David Nelson (Chair), Bill Gray, and Chris Cook

PAPER SELECTION
Chris Cook (Chair), Steve Ditchkoff, and Keith Causey

TECHNICAL SESSIONS
Chris Cook (Chair), Bill Gray, and Ray Metzler

SOCIAL EVENTS AND ENTERTAINMENT
Bill Gray (Chair), Chris Cook, and Charles Sharp

STUDENT PAPER AWARD
Steve Shea (Chair) and Chris Cook

TRANSPORTATION/COMPANION FIELD TRIPS
Bill Gray

EXHIBITORS/VENDORS/MEDIA
David Nelson (Chair), Chris Cook, and Bill Gray

SECURITY
Charles Sharp