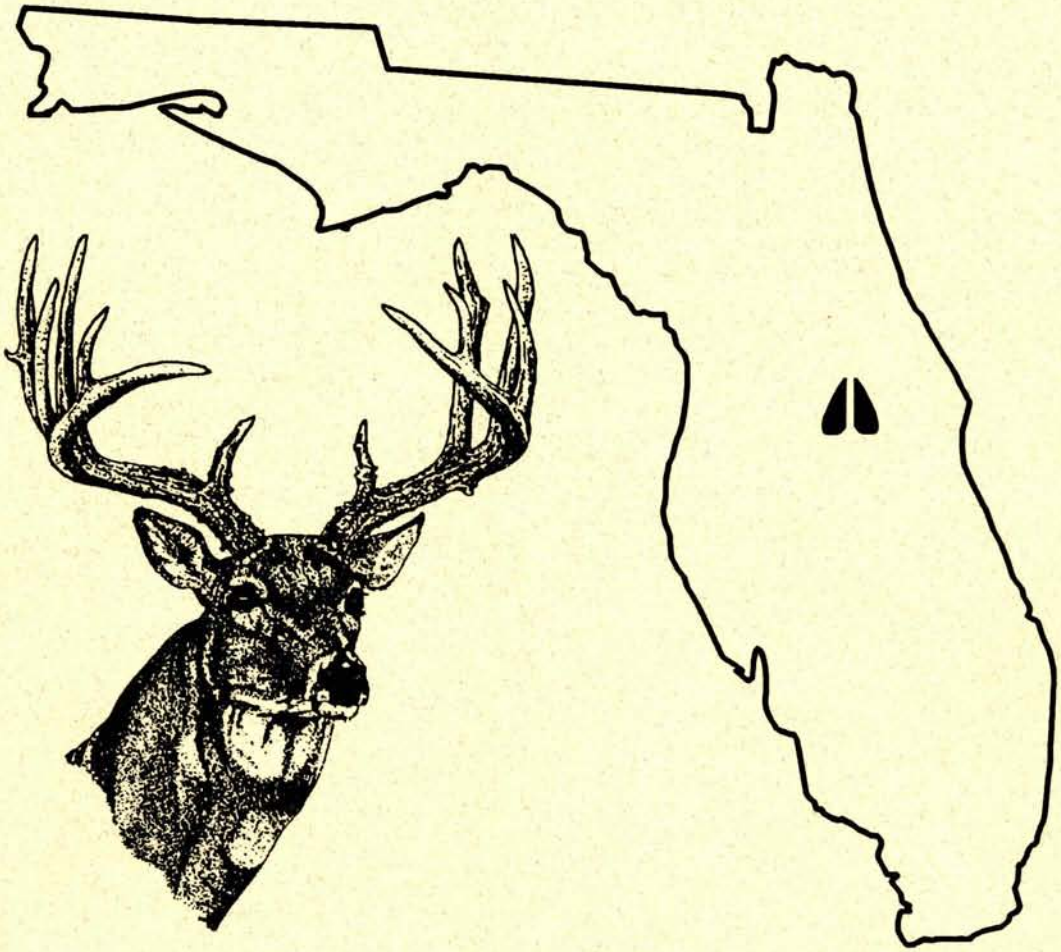
19th
Annual Meeting of the
Southeast Deer Study Group



February 25-28, 1996
Holiday Inn International
Orlando, Florida

Hosted By:
The Florida Game and Fresh Water Fish Commission

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THE SOUTHEAST DEER STUDY GROUP

The Southeast Deer Group was formed as a subcommittee of the Forest Game Committee of the Southeastern Section of The Wildlife Society. 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
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 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

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

Name	State	Employer
David K. Nelson	Alabama	Alabama Department of Conservation and Natural Resources
Michael E. Cartwright	Arkansas	Arkansas Game and Fish Commission
Robert E. Vanderhoof	Florida	Florida Game and Fresh Water Fish Commission
Stephen M. Shea	Florida	Department of Defense
Kent E. Kammermeyer	Georgia	Georgia Department of Natural Resources
John H. Phillips	Kentucky	Kentucky Department of Fish and Wildlife Resources
David W. Moreland	Louisiana	Louisiana Department of Wildlife and Fisheries
Edward J. Golden	Maryland	Maryland Department of Natural Resources
Larry Castle	Mississippi	Mississippi Department of Wildlife, Fisheries and Parks
Lonnie P. Hansen	Missouri	Missouri Department of Conservation
J. Scott Osborne	North Carolina	North Carolina Wildlife Resources Commission
Kenneth L. Gee	Oklahoma	The Samuel Roberts Noble Foundation
Michael G. Shaw	Oklahoma	Oklahoma Department of Wildlife Conservation
David C. Guynn, Jr.	South Carolina	Clemson University
Derrell A. Shipes	South Carolina	South Carolina Wildlife and Marine Resources Department
Greg Wathen	Tennessee	Tennessee Wildlife Resources Agency
Steve Demarais	Texas	Texas Tech University

Scot Williamson	Texas	Texas Parks and Wildlife Department
W. Matt Knox	Virginia	Virginia Department of Game and Inland Fisheries
Michael A. Coffey	Washinton, D. C.	National Park Service
Jim Crum	West Virginia	West Virginia Department of Commerce, Labor, and Environmental Resources

Program Agenda

SUNDAY, FEBRUARY 25, 1996

1-6pm Registration—Hotel Lobby

3:00pm Southeast Deer Committee Meeting (The Palm Room)

6:00pm-10:00pm Reception, Poolside

MONDAY, FEBRUARY 26, 1996

All sessions will be held in the Florida Ballroom; informal attire only, please.

7-9am Registration

8:30am Welcome; Introductions; Announcements—*Allan L. Egbert*, Executive Director, Florida Game and Fresh Water Fish Commission

Technical Session I—Moderator: *Frank Montalbano, III*, Florida Game and Fresh Water Fish Commission

8:50am **Deer Management Philosophies: Bridging the Gap Between the Public and Biologists**
David C. Guynn, Clemson University

9:30am **Gaining Public Consent to Agency Deer Management: Balancing Ecological and Socio-economic Interests in Wisconsin**
William J. VanderZouwen, Wisconsin Department of Natural Resources

9:50am **Managing an Ecologically Dominant Species for Ecosystem Integrity: Can it be Accomplished for the White-Tailed Deer in Pennsylvania Forests?**
Duane R. Diefenbach, *William L. Palmer*, *William K. Shope*, and *Bret D. Wallingford*, Pennsylvania Game Commission

10:10am BREAK

Technical Session II—Moderator: Ken Gee, The Samuel Roberts Noble Foundation, Inc.

10:30am **Patterning White-Tailed Deer Hunters**
Catherine Albers, U.S.D.A. Forest Service, and *Michael H. Legg*, Stephen F. Austin State University

10:50am **What Constitutes Trophy Antlers to Georgia Hunters?**
William O. Fletcher, H. Todd Holbrook, and *Kent E. Kammermeyer,* Georgia Department of Natural Resources

11:10am **Unusual Abundance of Melanistic White-Tailed Deer in Central Texas: Public Perceptions and Management Implications**
John T. Baccus and *John C. Posey,* Southwest Texas State University

11:30am **Differences Between Arkansas Hunt Clubs in Quality Deer Management and Traditional Deer Management Programs**
Philip A. Tappe and *Richard A. Williams,* University of Arkansas

11:50am **Southeastern Deer Study Group Annotated Bibliography 1991-1995**
Richard F. Harlow and *David C. Guynn, Jr.*, Clemson University; *Mark O. Bara,* South Carolina Department of Natural Resources; and *Kenneth L. Gee,* Noble Foundation

12:10pm **LUNCH** (On your own)

Technical Session III—Moderator: Harry Jacobson, Mississippi State University

1:30pm **Herd Reduction/Quality Deer Management Using Bowhunting: An Illinois Case Study**
Ronald L. Willmore, Illinois Power Company, and *M. Steven Pallo,* Illinois Department of Natural Resources

1:50pm **Effects of Raccoon Hunting on White-Tailed Deer Movement and Harvest Potential**
Jim D. Westerhold, Tim Fendley, Clemson University, and *O. E. Baker,* South Carolina Department of Natural Resources

2:10pm **Predicting Seasonal and Annual Flux in White-Tailed Deer Carrying Capacity in South Texas**
Don A. Draeger, Robert E. Hall, and *Charles A. DeYoung,* Texas A & M University—Kingsville

2:30pm **The Influence of Temporal and Spatial Factors on Clearcut Use by North Idaho White-Tails**
Mark L. Secord, Bee County College, and *Pete Zager,* Idaho Department of Fish & Game

2:50pm **Evaluation of Spike Harvest Prohibition as a Quality Deer Management Harvest Strategy in Florida**
Steven M. Shea and *Carl J. Petrick,* Department of Defense, and *Neill Hunter,* U.S. Fish and Wildlife Service

3:10pm BREAK

Technical Session IV—Moderator: Robert E. Zaiglin, Harrison Interests, Ltd.

3:40pm Volatiles from the Urine and Tarsal Hairs of Male White-Tailed Deer
Jonathan W. Gassett, University of Georgia; *D. P. Wiesler*, Indiana University; *David A. Osborn* and *Karl V. Miller*, University of Georgia; *M. Novotny*, Indiana University; and *R. Larry Marchinton*, University of Georgia

4:00pm Effects of Human Disturbance on Movements of Different-Aged Male White-Tailed Deer in South Texas
Mickey W. Hellickson, *Scott T. Rhodes*, and *R. Larry Marchinton*, University of Georgia, and *Charles A. DeYoung*, Texas A & M University—Kingsville

4:20pm The Effect of Abrupt Hierarchical Disturbance on Breeding Behaviors of Young Whitetail Bucks
David L. Ledford, *David A. Osborn*, *R. Larry Marchinton*, and *Karl V. Miller*, University of Georgia

4:40pm Feeding Periodicity of White-Tailed Deer in Mississippi
Harry A. Jacobson, Mississippi State University

5:00pm DINNER (On your own)

7:10pm Refreshments—Florida Ballroom Foyer

7:30pm Shoot from the Hip Session: Deer Population Monitoring: Indices or Fallacies?—Moderator: *Robert E. Vanderhoof*
Panelists:
Min T. Huang, Florida Game and Fresh Water Fish Commission
Kent E. Kammermeyer, Georgia Department of Natural Resources
Richard A. Lancia, North Carolina State University
John Philips, Kentucky Department of Fish and Wildlife Resources
Butch Young, Texas Parks and Wildlife Department

TUESDAY, FEBRUARY 27, 1996

Technical Session V—Moderator: Steve Demarais, Texas Tech University

8:30am Relationship Between Hemorrhagic Disease and Herd Immunity to the Epizootic Hemorrhagic Disease and Bluetongue Viruses
David E. Stallknecht, *Victor F. Nettles*, and *W. Randolph Davidson*, Southeastern Cooperative Wildlife Disease Study

8:50am **A Genetic Link to Hemorrhagic Disease, Evidence from a Captive Deer Herd in Mississippi**
Harry A. Jacobson, Mississippi State University

9:10am **Patterns of Deer-Car Accidents in South Carolina**
Paul E. Johns, *James M. Novak*, and *Michael H. Smith*, Savannah River Ecology Laboratory

9:30am **Effectiveness of an Experimental Crossing Structure at Reducing Deer-Vehicle Collisions Near Park City, Utah**
Mark E. Lehnert and *John A. Bissonette*, Utah Cooperative Fish & Wildlife Research Unit

9:50am **Effects of Herbivory and Canopy Gap Size on Forest Regeneration in a Bottomland Hardwood Forest**
Steven B. Castleberry, University of Georgia; *William M. Ford*, Westvaco, Inc.; *Karl V. Miller*, University of Georgia; and *Winston P. Smith*, U.S.D.A. Forest Service

10:10 **BREAK**

Technical Session VI—Moderator: Robert J. Warren, University of Georgia

10:30am **Use of Vaginal Implant Transmitters for Discovery of Birth Sites of White-Tailed Deer**
Jacob L. Bowman and *Harry A. Jacobson*, Mississippi State University

10:50am **Using Exogenous Hormones to Advance Estrus in White-Tailed Deer**
David A. Osborn, *Jonathan W. Gassett*, *Karl V. Miller*, *R. Larry Marchinton*, and *Terry E. Kiser*, University of Georgia

11:10am **Empirical Testing of Transmission Genetics and Sire Determination Using a Panel of Microsatellite Loci**
John C. Patton, LGL Ecological Genetics, and *James C. Kroll* and *Ben Koerth*, Stephen F. Austin University

11:30am **Development and Implementation of a Geographic Information System for Deer in Minnesota**
Dave R. Schad and *Steve Benson*, Minnesota Department of Natural Resources

11:50am **Using a Geographic Information System to Evaluate Deer Management Zones in Arkansas**
Philip A. Tappe and *Robert C. Weih*, University of Arkansas, and *Michael E. Cartwright*, Arkansas Game and Fish Commission

12:10pm **LUNCH** (On your own)

Technical Session VII—Moderator: M. Keith Causey, Auburn University

1:30pm **Growth of White-Tailed Deer Fawns Following Dietary Protein Restriction**
Billy C. Lambert, Jr. and *Steve Demarais*, Texas Tech University, and *Eric Hellgren*, Oklahoma State University

1:50pm **Sodium Nutrition and Requirements of White-Tailed Deer**
William J. Pitts and *Eric C. Hellgren*, Texas A & M University—Kingsville

2:10pm **Use of Calplex 50 to Enhance Agronomic Forage Production for White-Tailed Deer**
Andreas Leidolf, *Robert Dew*, and *Harry A. Jacobson*, Mississippi State University

2:30pm **Establishment Cost of Forage Plantings for White-Tailed Deer Relative to Production**
Neil A. Waer, *H. Lee Stribling*, and *M. Keith Causey*, Auburn University

2:50pm **Chinese Privet's Role in the Nutrition and Feeding Ecology of Deer in Northwestern Georgia**
Karl A. K. Stromayer, *Robert J. Warren*, *Albert S. Johnson*, and *Carolyn L. Rogers*, University of Georgia; *Chris L. Tucker*, Florida Game and Fresh Water Fish Commission; and *Philip Hale*, University of Georgia

3:10pm **BREAK**

Technical Session VIII—Moderator: *Timothy E. O'Meara*, Florida Game and Fresh Water Fish Commission

3:40pm **Survival and Growth of White-Tailed Fawns Prematurely Weaned at 60 and 90 Days**
Jacob L. Bowman and *Harry A. Jacobson*, Mississippi State University

4:00pm **Observations of Mortality and Emigration in a Coastal South Carolina Population of White-Tailed Deer**
James H. Dozier, *Tim Fendley*, and *Kieth Morgan*, Clemson University; *Wallace Roberts*, Westvaco Inc.; *Derrel Shipes*, South Carolina Department of Natural Resources; and *Elizabeth Turner*, Clemson University

4:20pm **Pooling Mandibles into Separate Age Classes Significantly Increases Precision of Age Estimates**
Grant R. Woods, Woods and Associates; *Micah Goldstein*, Georgia Pacific Corporation; and *Robert A. Schorr*, University of Georgia

4:40pm **Reproductive Characteristics of Missouri White-Tailed Deer**
Jeff Beringer and *Lonnie P. Hansen*, Missouri Department of Conservation

5:00pm **BUSINESS MEETING**

7:00pm **BANQUET**

WEDNESDAY, FEBRUARY 28, 1996

FIELD TRIPS (transportation provided)

8:00am- A. Duda & Sons Cocoa Ranch,
5:00pm Rockledge, Florida

10:00am- Gatorland—Alligator Farm, Orlando,
1:30pm Florida

12:30pm- Gatorland—Alligator Farm, Orlando,
4:00pm Florida

ABSTRACTS

MONDAY, FEBRUARY 26, 1996

Technical Session I - Moderator: *Frank Montalbano, III*, Florida Game and Fresh Water Fish Commission

8:50 AM

Deer Management Philosophies: Bridging the Gap Between Hunter and Biologist
David C. Guynn, Jr., Clemson University

The use of sport hunting as a management tool is assuming increasing urgency as deer populations continue to grow in most areas and exceed desirable levels. Management emphasis is shifting from sport hunting to reduction of deer/vehicle collisions, agricultural and timber damage and possibly Lyme disease transmission. As more segments of society experience negative interactions with deer, the demand for effective deer population management will intensify. A looming question is "for whom do we manage deer and for what purposes?" In many situations the answer is shifting from managing for hunters to provide recreation to managing for society at large to optimize positive interactions or to minimize negative interactions. The next question is how can hunting serve as a tool for meeting these broader objectives and providing recreational opportunities? The situation is further complicated by changing attitudes toward animals along with increasing urbanization, declining agriculture, an aging society, and changing roles of women. These factors collectively inhibit the recruitment of potential hunters with the net effect being that the number of hunters will remain stable or decline and sport hunting will be viewed as an antisocial activity among numerous groups of society. It is imperative that hunters and biologists establish strong working relationships and effective communication mechanisms.

Working relationships between hunters and biologists can be strengthened by involving hunters in the management process, particularly on private lands. Biologists need to understand why people hunt deer and the stages of hunter development. Major motivations for hunting have been described as affiliation, achievement and appreciation with most hunters displaying 5 stages of development (shooter, limiting out, trophy, method and mellowing out). Education programs can be targeted to segments of hunter populations relative to their motivation and stage of development. All programs should strive to instill motivation to value participation in management by providing service to society and producing a natural deer population structure. Existing Deer Management Assistance Programs provide a basis for such educational programs and, with proper media contacts, opportunities for hunters to be recognized for their service to local communities. Certification of hunters in sensitive areas such as archery hunting in suburban areas would increase credibility with the non-hunting public and should increase harvest efficiency. Flexibility in regulations and training of hunters will be needed to accommodate local situations.

Biologists must become involved in educational programs not only with hunters but with non-hunters as well. Community involvement in civic organizations and school programs can provide recognition of the wildlife profession and create a positive image for hunting. Adult/child hunts,

charitable donation of venison and programs to introduce people to hunting such as the Outdoors Women program need to be promoted by biologists and hunters.

9:30 AM

Gaining Public Consent to Agency Deer Management: Balancing Ecological and Socio-Economic Interests in Wisconsin
William J. VanderZouwen, Wisconsin Department of Natural Resources

Wisconsin's deer management program consists of deer range measurements, population estimation, and antlerless deer permit calculations to manage populations at established goals in over 120 deer management units; deer crop damage programs; and hunting regulation reviews and hearings. Wisconsin has a long history of public involvement in deer management decisions, beginning with the Conservation Congress which was statutorily created in the 1930's. Deer management deliberations have involved a wider range of stakeholders during recent years to better assess public desires and develop support for a balanced management approach. During 1994, 17 Regional Task Forces (RTFs) were formed to seek public advice. RTFs were comprised of representatives of the Conservation Congress, Farm Bureau, Land Conservation Committees, sheriff's departments, environmental organizations, sportsmen alliances, deer hunting organizations, insurance companies, county foresters, and others. Survey results indicated a great deal of RTF member satisfaction with the process. A supporting document, Wisconsin's Deer Management Program: The issues involved in decision making, was developed to gain public understanding of management issues. A comprehensive Environmental Assessment (EA) was prepared to help the Department and the public understand the socio-economic, ecological, and management capability impacts of deer management alternatives. We are optimistic that our recent public involvement process and products will improve understanding and acceptance of agency deer management decisions. We offer them for consideration to Southeast agencies as potential methods to bridge the gap between managers and the public.

9:50 AM

Managing an Ecologically Dominant Species for Ecosystem Integrity: Can it Be Accomplished for the White-tailed Deer in Pennsylvania Forests?
Duane R. Diefenbach, William L. Palmer, William K. Shope, and *Bret D. Wallingford*, Pennsylvania Game Commission

We used harvest and reproductive data to estimate deer densities during 1982-94, and 1978 and 1989 forest inventory data to estimate overwinter deer densities that would not adversely affect forest regeneration. We found that the overwinter deer density that Pennsylvania forests could support had declined, statewide, from 23 to 21 deer/259 ha of forest between 1978 and 1989. In 1994, statewide deer densities were 41% above the Pennsylvania Game Commission's (PGC) goal of 21 deer/259 ha of forest. In 1995 we conducted a survey of hunters to assess their opinions about deer populations, deer management, and deer-human conflicts. The majority of hunters (44%) agreed antlerless permits should be reduced, and 19% believed they should be eliminated. The majority of hunters agreed controlling deer populations is necessary (87%), deer populations should be kept in balance with natural food supplies

(89%), and that deer affect plant and animal communities (56%). However, the majority disagreed that damage to Pennsylvania forests by deer is a problem (57%), or that deer cause serious conflicts with other land uses (44%). We believe that reducing deer populations to protect forest ecosystems will require that hunters understand the adverse effects of too many deer on forest communities. However, public support will be needed during the process of public comment on establishing deer management goals and antlerless license allocations. In addition, more research is needed to address the effects of deer densities on the biological diversity of Pennsylvania's forested ecosystems.

Technical Session II—Moderator: *Ken Gee*, The Samuel Roberts Noble Foundation, Inc.

10:30 AM

Patterning White-Tailed Deer Hunters
Catherine Albers, U.S.D.A. Forest Service, *Michael H. Legg*, Stephen F. Austin State University

Hunting club members, who lease Temple-Inland, Inc. lands in east Texas for hunting, were surveyed as to their attitudes, interests and opinions of management and hunting experiences. The survey, administered to 591 hunting lease members in August and September of 1994, examined demographic and socio-economic characteristics, hunters willingness to pay for a variety of amenities associated with hunting leases, and benefits sought from the hunting experience. The members surveyed were segmented according to the benefits sought from hunting and well as socio-economic information. Members also were segmented according to importance of hunting as a leisure activity and positive experiences they associate with hunting. Preliminary results of factor analyses indicate two factors are present in best describing the benefits sought from hunting. The first factor may be described as a spiritual component or "feeling in tune with nature" while the second factor may be described as "successfully harvesting game."

10:50 AM

What Constitutes Trophy Antlers to Georgia Hunters?
William O. Fletcher, *H. Todd Holbrook*, and *Kent E. Kammermeyer*, Georgia Department of Natural Resources

With growing popularity of quality deer management, there is an increasing need to define minimum criteria for antlers to be considered trophy and protect smaller bucks. To determine what constituted a trophy to the average hunter, we compiled questionnaires from 792 Georgia hunters who rated one of 7 sets of deer antlers ranging from 7-10 points with Boone and Crockett (B&C) scores ranging from 65 to 121 ½. Most participants (72%) had been hunting for more than 10 years. Two of 7 sets of antlers were considered a trophy by the majority of hunters polled. An 8 point with 18 ½ inch outside spread and 121 ½ B&C points was an obvious choice (85%). Second choice was an 8 point with a 15 5/8 inch spread and 98 B&C points (60%). An 8 point with the same spread and 100 3/8 B&C points was only chosen by 32% of those surveyed. The difference in these two antlers was in main beam circumference (4 ½ versus 3 5/8 inches) and beam length (20 1/8 versus 17 7/8 inches). No other antler rated higher than 22% despite all having from 7 to 10 points. Hunters indicated a strong willingness to pass bucks equal to

or smaller than the antlers they viewed (range of 62% to 78%). There were also regional differences in trophy perception with rural hunters having higher standards. A hunter's perception of a trophy changed with experience and the antler size of their best kill. Traditional trophy buck minimum standards using points and outside spread may be inadequate to establish restrictive regulations necessary to please a majority of hunters. Finally, will a hunter refrain from pulling the trigger according to his original minimum set of criteria for antler size?

11:10 AM

Unusual Abundance of Melanistic White-Tailed Deer in Central Texas: Public Perceptions and Management Implications

John T. Baccus and *John C. Posey*, Southwest Texas State University

Melanism, a common color morphism in some mammalian taxa, is uncommon in Artiodactyla and extremely rare in white-tailed deer (*Odocoileus virginianus*). Melanistic white-tailed deer have been harvested in South Carolina, Michigan, New York, and Idaho. A substantial population of melanistic white-tailed deer inhabits central Texas. The objectives of our study were to determine the distribution, define color shades and frequencies at census sites, and identify management strategies for melanistic white-tailed deer in central Texas. Hahn and mobile census lines, stand observations, and surveys of hunters and landowners provided information on the species. The pelage color of melanistic deer was based on comparisons of standard color plates with photographs and video tapes. From August 1989 to November 1995, 218 melanistic deer were observed in 3,768 deer-sightings in seven central Texas counties. The highest percentage of Melanistic deer (21%) in the population occurred in a 1.6×10^3 km^2 area in eastern Hays and western Travis counties; the percentage for all counties was 8.5. Five melanic color shades (seal brown, 54.5%; argus brown, 18.2%; bister, 16.9%; iron gray, 5.2%; and blackish-slate, 5.2%) were identified in the population. Survey results indicated hunters and landowners were confused about a harvest strategy for melanistic deer. Melanistic deer were perceived as a different species, an endangered species, or sika deer (*Cervus nippon*). Some landowners actively protected melanistic deer, while others harvested all deer. When adjacent landowners have different perceptions about managing deer, then the management of this unique color morph of the white-tailed deer is a challenge.

11:30 AM

Differences Between Arkansas Hunt Clubs in Quality Deer Management and Traditional Deer Management Programs

Philip A. Tappe and *Richard A. Williams*, University of Arkansas

Hunt clubs in Arkansas were surveyed to compare opinions on hunting and leasing between clubs involved with Quality Deer Management Programs (QDMPs) and those in Traditional Deer Management Programs (TDMPs). Club members' reasons for leasing did not differ between groups except in two areas. Club members in QDMPs ranked being with friends ($\chi^2 = 8.03$, df = 4, $P = 0.09$) and the chance to bag a quality deer ($\chi^2 = 13.88$, df = 4, $P < 0.01$) higher than those in TDMPs. Gates were considered more important to members in QDMPs than in TDMPs ($\chi^2 = 10.62$, df = 4, $P = 0.03$). Trespassing ($\chi^2 = 6.18$, df = 1, $P = 0.01$) and the dumping of trash ($\chi^2 = 5.63$, df = 1, $P = 0.02$)

decreased hunting satisfaction for club members in TDMPs more so than those in QDMPs. Opinions on lease fees and perceived effects of leasing on hunting in the future did not differ between groups.

11:50 AM

Southeastern Deer Study Group Annotated Bibliography 1991-1995
Richard F. Harlow and *David C. Guynn, Jr.*, Clemson University, *Mark O. Bara*, South Carolina Department of Natural Resources; and *Kenneth L. Gee*, Noble Foundation

The second Southeast Deer Study Group annotated bibliography includes abstracts presented during the years 1991 through 1995. A total of 306 authors and co-authors contributed 213 papers. Funding of the projects was provided by 118 agencies, both public and private. A total of 33 states, including 16 southern, 10 northern, 7 western, as well as 4 Canadian Provinces were represented. Sixty-one percent of the 213 papers presented were from the states of Georgia (71), Texas (43), South Carolina (33), and Mississippi (25). Most prevalent topics over the 5-year period, in descending order, included: Deer harvest and management, foods and food habits, physical and physiological investigations, population studies, and genetics.

Technical Session III—Moderator: *Harry A. Jacobson*, Mississippi State University

1:30 PM

Herd Reduction/Quality Deer Management Using Bowhunting: An Illinois Case Study
Ronald L. Willmore, Illinois Power Company, and *M. Stephen Pallo*, Illinois Department of Natural Resources

Overpopulation of white-tailed deer within a refuge resulted in extensive forest and agricultural crop damage. The purpose of this study was to: (1) provide a quantitative evaluation of the type and extent of damage caused by excessive deer numbers; and (2) develop a special archery hunt which would significantly reduce the population of deer in the area. Forest damage was evaluated by browse damage surveys while vegetation damage was evaluated with deer exclosures. Agricultural crop damage surveys were also conducted. Quantitative population estimates (440 deer / $mi.^2$) validated the suspected problem. The solution - an archery only deer hunt was initiated in 1991.

Methods used to insure the success of the archery hunt included: (1) free antlerless deer permits (first 3 years), with unrestricted antlerless deer harvest; (2) one antlerless deer must be harvested before a buck could be taken (the last two years, a doe must be harvested); (3) only one mature buck allowed per hunter (preferably at a minimum - a Pope and Young buck); (4) good communications with local "hard core" bowhunters; (5) a "carrot" (good numbers of large bucks); and (6) excess deer donated to the local food pantry.

During 4 years of the special archery hunt, 490 deer have been harvested from approximately 1,000 acres of timber. This includes 340 (69%) does, 103 button bucks, and 47 mature bucks, of which, 64% qualified for the Pope and Young record book. A herd reduction of approximately 67% in 4 years, has

resulted in decreased forest and crop damage, increased biodiversity, and increased recreational opportunities.

1:50 PM

Effects of Raccoon Hunting on White-Tailed Deer Movement and Harvest Potential
Jim D. Westerhold and *Tim Fendley,* Clemson University, and *O. E. Baker,* South Carolina Department of Natural Resources

The impact of raccoon (*Procyon lotor*) hunting with trained hounds on movement, daily use area, and harvest potential of white-tailed deer (*Odocoileus virginianus*) was studied on Westvaco's North Whitener Tract in Jasper County, South Carolina from 13 Dec. 93 through 1 Mar. 94 and 20 Dec. 94 through 18 Feb. 95. Two groups (treatment and control) of radio-instrumented deer were selected from a larger group of radio-instrumented deer. Minimum Total Distance moved per day (MTD), 4 (6-hour) subsets of MTD, and daily use area, were calculated and/or plotted from radio-locations during the 24-hour period before and the 24-hour during and after a raccoon hunt for each radio-instrumented deer. There were no significant differences between treatment and control in before hunt and after hunt differences for any of the movement parameters. The percent overlap for each deer's daily use area before hunt and its respective after hunt daily use area did not differ between treatment and control areas. Photographs were taken, as an indicator of deer harvest potential, at 7 baited sites in both the treatment and control areas in the morning and afternoon the day prior to the raccoon hunt and the day following the raccoon hunt. The difference for each camera location before the hunt and after the hunt was calculated for total deer per frame and was not significantly different between treatment and control. This study provides no evidence that raccoon hunting with trained hounds impacts movement, daily use area, or harvest potential of white-tailed deer.

2:10 PM

Predicting Seasonal and Annual Flux in White-Tailed Deer Carrying Capacity in South Texas
Don A. Draeger, Robert E. Hall, and *Charles A. DeYoung,* Texas A & M University—Kingsville

The preferred method of determining carrying capacity for white-tailed deer (*Odocoileus virginianus*) has been sampling plant biomass, energy, and nitrogen. However, questions arise about the accuracy of these estimates because numerous assumptions are used in the predictions. Digestible energy (Kcal) absorbed from vegetation consumed by tame deer in portable enclosures, first used by Clark (1977), may be an alternative to traditional methods used to estimate carrying capacity. Hellickson (1991) used the tame deer technique to study variation in deer carrying capacity on the Welder Wildlife Refuge in San Patricio County, Texas and found a strong positive correlation exist between plant biomass and tame deer estimates of carrying capacity.

Data were collected on the 18,020 ha Faith Ranch in Dimmit County, Texas from September 1994 to November 1995. The objectives for the study were: (1) to replicate Hellickson's (1991) experiment to further test the hypothesis that grazeable plant biomass can be used to predict carrying capacity in south Texas; (2) to determine fluctuations in carrying capacity caused by precipitation and temperature and: (3) to compare carrying capacity of recent (6 yrs. old) root plowed versus non-root plowed sites.

Preliminary results support the conclusions of Hellickson (1991). Our results combined with Hellickson's (1991) results provides another step toward the creation of a model that would determine carrying capacity from grazeable plant biomass.

2:30 PM

The Influence of Temporal and Spatial Factors on Clearcut Use by North Idaho White-Tails
Mark L. Secord, Bee County College, and *Pete Zager*, Idaho Department of Fish and Game

Relatively little is known about the response of white-tailed deer (*Odocoileus virginianus*) to the forest management practices currently used in northern Idaho. We used pellet-group surveys and radio-telemetry to assess the influence of season, clearcut age, and clearcut size on deer use in the Priest Lake watershed of northern Idaho. Deer use of 14 clearcuts ranging from 1 to 25 years in age and 4.05 to 14.75 ha in size was investigated. No association between pellet-group density and clearcut size or age was found. However, both pellet-group and telemetry data revealed seasonal shifts in white-tailed deer habitat use patterns. Deer displayed strong avoidance of non-forested sites during winter, and concentrated on low elevation winter ranges characterized by dense overstories. With the advent of warm weather and reduced snow depths, non-forested sites received increasing levels of use. Clearcut use peaked during early spring and declined with the onset of summer as deer migrated to higher elevations. Spring use of clearcuts was significantly higher than summer use on all sites sampled. Spring pellet-group densities averaged 0.76 groups/plot, whereas summer densities averaged 0.25 groups/plot. In the Priest Lake drainage, cutting units should be restricted to less critical sites adjacent to wintering areas. Clearcuts within winter habitats will further fragment existing forested stands and will be at the expense of critical thermal cover. In other regions, vegetation structure and composition should not be the only criteria used to evaluate the influence of clearcutting on white-tailed deer habitat use.

2:50 PM

Evaluation of Spike Harvest Prohibition as a Quality Deer Management Harvest Strategy in Florida
Steven M. Shea and *Carl J. Petrick*, Department of Defense, and *Neill Hunter*, U.S. Fish and Wildlife Service

Quality deer management (QDM) is not frequently practiced in coastal plain habitats of northwest Florida. The benefits of QDM are much less obvious in this region where nutritional deficiencies, late birth, and genetics adversely effect antler mass, body size, and recruitment. However, poor antler development of yearling bucks, 90% of which are spikes, provides an antler phenotype that can be used to protect most yearling bucks. Implementation of a branched-antler law was initiated on Tyndall AFB in Bay County, Florida in 1992. Bucks were required to have branched antlers to be legal to harvest. Prior to this regulation, bucks with $\geq$ 1 inch antlers were legal to harvest. The mean annual percentages of bucks in the 1.5, 2.5, and $\geq$ 3.5 year-old age classes from 1986-91 were 55.0%, 27.3%, and 17.7%, respectively. The mean number of antler points, beam length, beam circumference, inside spread, and whole weight were 3.9, 8.5 in, 2.4 in, 7.0 in, and 103.8 lbs, respectively. Under the branched-antler law from 1992-95, the mean annual percentages of bucks in the 1.5, 2.5, and $\geq$ 3.5 year-old age classes were 6.0%, 45.2%, and 48.8%, respectively. Significant increases ($P < 0.05$) in mean antler measurements

and weight also occurred. The mean number of antler points, beam length, beam circumference, inside spread, and whole weight were 6.2, 12.9 in, 3.0 in, 9.7 in, and 122.1 lbs, respectively. A 40% reduction in the buck harvest occurred the first year that spikes were protected, followed by an 18% reduction in subsequent years. This harvest management strategy is easily understood by hunters and greatly improves the age structure and quality of bucks harvested in this region.

Technical Session IV—Moderator: *Robert E. Zaiglin*, Harrison Interests, Ltd.

3:40 PM

Volatiles From the Urine and Tarsal Hairs of Male White-Tailed Deer
Jonathan W. Gassett, University of Georgia; *D. P. Wiesler*, Indiana University; *David A. Osborn* and *Karl V. Miller*, University of Georgia; *M. Novotny*, Indiana University; and *R. Larry Marchinton*, University of Georgia

Deposition of urine on the tarsal glands via rub-urination is one of the more conspicuous scent-marking behaviors made by white-tailed deer. In December 1993, we collected urine and tarsal hair samples from 12 male deer of various ages and compared their volatile compounds to determine if odors from these two sources differed. Because bacteria often are associated with odor production via decomposition of conjugated compounds and production of volatile waste products, we also compared voided urine and tarsal samples to voided urine spiked with tarsal bacteria. Gas chromatography-mass spectroscopy revealed a minimum of 167 compounds. Differences in the presence and/or concentration of volatiles occurred among voided urine, spiked urine, and tarsal hair. Volatile composition likely is influenced by bacterial decomposition of conjugated compounds, bacterial waste products, selective retention of volatiles by tarsal sebum, and production of volatiles by the tarsal gland. Variability among individuals suggests that the tarsal gland may provide an individual olfactory signature. Age class differences suggest that tarsal odors may play a role in age and/or dominance recognition.

4:00 PM

Effects Of Human Disturbance on Movements of Different-Aged Male White-tailed Deer In South Texas
Mickey W. Hellickson, *Scott T. Rhodes*, and *R. Larry Marchinton*, University of Georgia, and *Charles A. DeYoung*, Texas A&M University—Kingsville

Human disturbance of white-tailed deer (*Odocoileus virginianus*) may cause increased movement, vulnerability to harvest, or changes in home range. Previous studies have focused on effects during the hunting season. We purposely disturbed males and measured their responses from August 1994 - September 1995 on a 15,800-acre study area in Dimmit and Webb counties, Texas. One hundred and thirty males (1.5-11.5 years old) were captured and fitted with radio transmitting collars during 1989-94. Forty-six males ($\bar{x}$ = 5.8 years old) were located 110 times during daylight hours ($\bar{x}$ = 1413 hours) using hand-held receivers. Once locations were mapped each male was approached from downwind. All males were then relocated >30 minutes after flushing. Pre- and post-disturbance locations were mapped and minimum and maximum distances between error polygons were measured to determine direction and

distance males traveled after disturbance. Mean elapsed time between flushing and post-location was 38 minutes (30-118 minutes). Mean minimum and maximum distance traveled after flushing was 1511 and 2120 feet (124-4866 feet). A negative relationship was determined between age and minimum (r^2 = 0.79) and maximum (r^2 = 0.63) distances traveled indicating a decrease in flight distance as males increase in age. Middle-age males (3.5-4.5 years old) traveled the longest distances while old males (7.5+ years old) traveled the shortest distances. A general decrease in movement with older age also occurred based on other data collected for the same population. We found no relationship between flight direction and wind direction. Six of 8 males remained together after disturbance.

4:20 PM

The Effect of Abrupt Hierarchical Disturbance on Breeding Behaviors of Young Whitetail Bucks
David L. Ledford, David A. Osborn, R. Larry Marchinton, and *Karl V. Miller*, University of Georgia

The sociobiology of white-tailed deer has been the subject of limited experimental investigation. However, the effects of social disturbance due to the harvest of individuals remains poorly understood. We manipulated the hierarchies of 3 social groups of captive deer to determine if the presence of a mature, dominant buck would suppress signposting and agonistic behaviors of younger subordinate bucks. In July 1995 at the University of Georgia's Whitehall Deer Research Facility, 3 social groups of deer were established. Each group consisted of a mature ($\geq$ 3.5 years) buck, two 2.5 year-old bucks, 2 yearling bucks, and 4 does. Signpost, agonistic, and other breeding related behaviors were monitored beginning on 11 September. The oldest buck in each enclosure was dominant. These dominants were removed from their groups on 6 November. During the month following dominant buck removal, rub-urination increased dramatically among all bucks remaining in the social groups. Other scent marking behaviors changed none or only slightly. The behaviors of subordinates before dominant buck removal, after removal, and after reintroduction were compared and will be reported.

4:40 PM

Feeding Periodicity of White-tailed Deer in Mississippi
Harry A. Jacobson, Department of Wildlife and Fisheries, Mississippi State University

Infrared timers (Trailmaster^R Lenexa, KS) were used to document activity at artificial feeding stations on the Circle Bar Ranch, Foxworth, Mississippi, March 1993 through February 1994. A total of 65,910 events were recorded. Cameras attached to infrared timers documented events caused by deer. Of 15,330 pictures taken, 14,501 (95%) were of deer, 404 were of wild turkeys, 79 were of humans, 231 were of other animals (birds and raccoons) and 115 were blank. Feeding activity during all months was principally nocturnal, beginning with dusk (1800-1900), peaking the first two hours after dusk, but maintaining high activity in all hours between dusk and dawn (0500-0600), with secondary feeding peaks at 2300 and 0500 hours. October through February had more late morning (0600-1100) feeder activity and August had slightly higher late afternoon (1400-1800) activity than other months. Although no months had high diurnal activity, December and January had the most. Of all deer photos taken, 11,036 (76%) were during nocturnal periods. Results indicate the white-tailed deer in Mississippi is nocturnal. Surprisingly, the most diurnal activity occurred during the hunting season.

TUESDAY, FEBRUARY 27, 1996

Technical Session V—Moderator: *Steve Demarais,* Texas Tech University

8:30 AM

Relationship Between Hemorrhagic Disease and Herd Immunity to the Epizootic Hemorrhagic Disease and Bluetongue Viruses
David E. Stallknecht, Victor F. Nettles, and *W. Randolph Davidson,* Southeastern Cooperative Wildlife Disease Study

Hemorrhagic disease (HD), which is caused by viruses in the epizootic hemorrhagic disease (EHD) and bluetongue (BT) serogroups, is the most important viral disease affecting white-tailed deer (*Odocoileus virginianus*) in the United States. Although these viruses are widely distributed over much of this species range, much regional variation exists in the extent of exposure and severity of disease. A simple 3-step model was constructed to represent the relationship between herd immunity and severity of disease. In the Southeast, reports of HD-related mortality occur most frequently from areas of limited exposure to few EHD and BT virus serotypes. In areas of increased exposure to multiple serotypes, reported disease occurs more frequently but most reports relate to the chronic form of the disease. In areas of extremely high exposure to multiple serotypes, little or no disease is reported. Results indicate that exposure to these viruses does not equate with disease, and that herd immunity patterns can be used as a predictor of disease risks.

8:50 AM

A Genetic Link to Hemorrhagic Disease Resistance, Evidence From a Captive Deer Herd in Mississippi
Harry A. Jacobson, Mississippi State University

An outbreak of hemorrhagic disease caused by EHDV-2 virus was documented in a captive herd of white-tailed deer (*Odocoileus virginianus*) in the August-October, 1994. Thirty-six (31.2%) of 114 deer died during the outbreak. The captive deer herd was of mixed genetic origin, including animal backgrounds originating from Mississippi, Virginia, Texas, Ohio, Pennsylvania, Michigan and Wisconsin. When examined by genetic background, 3 of 24 (12.5%) deer with pure southern origins, 11 of 17 (64.7%) deer with northern origins, 19 of 44 (43.2%) deer which were 50% northern and 50% southern crosses, and 5 of 29 (17.2%) deer which were 25% northern and 75% southern crosses died during the outbreak. All deer were born in Mississippi and had the same prior exposure histories, except for 6 deer born in Michigan. Five of these Michigan deer (2 6-year-old and 3 5-year-old does) were translocated to Mississippi while newborn fawns. The remaining Michigan deer was a 9-year-old buck which had been translocated a year earlier. Differences in mortality rates between the above genetic groupings were significantly different at $P < 0.001$ ($\chi^2 = 175$, with 3 d.f.). These findings could have important management implications for translocation of wildlife.

9:10 AM

Patterns of Deer-Car Accidents in South Carolina
Paul E. Johns, *James M. Novak*, and *Michael Smith*, Savannah River Ecology Laboratory

Date, time of day, sex and age were collected from over 600 white-tailed deer (*Odocoileus virginianus*) involved in deer-car accidents on the Savannah River Site near Aiken, South Carolina from 1990-1995. Data were analyzed to determine any seasonal or diurnal patterns by sex and age. Accidents occur most often around one hour before and after sunrise and sunset. Adult males were involved in most of the accidents occurring during the peak months of October through December. The peak period for auto accidents coincides with the rut period in this area. The high adult male mortality is probably attributed to the breeding behavior. These results can be used in educating the driving public in order to lower the frequency of deer-car accidents resulting in substantial cost savings.

9:30 AM

Effectiveness Of An Experimental Crossing Structure At Reducing Deer-Vehicle Collisions Near Park City, Utah
Mark E. Lehnert and *John A. Bissonette*, Utah Cooperative Fish and Wildlife Research Unit

Rerouting of highways associated with the recently built Jordanelle Reservoir resulted in a fourteen-fold increase in deer-vehicle collisions. Deer-proof fencing and nine newly-designed structures that aid deer in crossing on the highway surface were installed along the new roads to address the problem. This mitigative system restricted deer crossings to specific areas along the highways where motorists were expecting them, thereby removing the element of surprise that plays a major role in most deer-vehicle collisions. Evaluation was carried out by: (1) comparing highway mortality levels between experimental and control areas; (2) using night-vision equipment to document deer behavior and movement patterns in the crossing zones; and (3) evaluating motorist response as they traveled through the crossing areas. Results indicated a reduction in highway mortality along a four-lane divided highway, but not along a two-lane highway. Along the two-lane road, deer; (1) spent considerably more time on the road surface; and (2) tended to wander more often outside the confines of the crossing zone searching for roadside forage. Both factors made deer along the two-lane highway more susceptible to vehicles. Motorists showed no response to warning signs associated with the structures. Proposed design modifications are focused on providing desired forage behind the fence line. This may reduce the tendency of deer to use the crossing structures as a means of accessing food along the highway corridor. However, the unwillingness of motorists to slow down in the crossing zones will continue to produce significant levels of roadway mortality.

9:50 AM

Effects of Herbivory and Canopy Gap Size on Forest Regeneration in a Bottomland Hardwood Forest

Steven B. Castleberry, University of Georgia; *William M. Ford*, Westvaco, Inc.; *Karl V. Miller*, University of Georgia; and *Winston P. Smith*, U.S.D.A. Forest Service

We created 36 canopy gaps in a bottomland hardwood forest at the Savannah River Site, South Carolina in December 1994 to study the influence of gap size and white-tailed deer (*Odocoileus virginianus*) herbivory on forest regeneration. Gap sizes were 7, 10, 14, 20, 29, and 40 m in radius, each with 6 replicates. Herbivore exclosures were constructed in the center of each gap, and at 6 locations in the surrounding forest. Each exclosure (7 m x 13 m) was subdivided into 2 deer excluded treatments and 2 control treatments. Two 0.5 m^2 vegetation plots in each treatment were sampled monthly from April through September. The number of available woody twigs by species and the number of twigs browsed were tallied. Total % coverage of herbaceous species and % browsed were recorded. The total twigs of all woody species and % coverage of herbaceous species did not differ between control plots and those that excluded deer. The number of woody twigs browsed and % herbaceous cover browsed did not differ over the range of gap sizes. There were differences ($p<0.05$) in the number of woody twigs available among gap sizes. Rates of deer herbivory were < 2% among most woody and herbaceous species during the growing season. Pellet group surveys indicated higher use in fall and winter when hard mast was present. Differing light regimes, soil disturbance from harvest, and competition from herbaceous species, particularly *Eupatorium spp.* likely are more important than deer herbivory in explaining regeneration patterns within gaps.

Technical Sesssion VI—Moderator: *Robert J. Warren*, University of Georgia

10:30 AM

Use of Vaginal Implant Transmitters for Discovery of Birth Sites of White-Tailed Deer

Jacob L. Bowman and *Harry A. Jacobson*, Mississippi State University

Fawns have been captured by many methods, with most captured after the first few days of life. These first few days of life may be crucial to fawn survival. Vaginal implants were tested in the past as a way to capture fawns at parturition. But, an effective means to hold the implant in the vagina was never developed. We developed a way to effectively hold the vaginal implant in the vaginal canal until birth. Sixteen does were captured and implanted in 1994 and 1995 on two areas in Mississippi. Longleaf Farms, predominantly pine, and Davis Island, bottomland hardwoods, represent two dramatically different vegetative communities. Does were checked 3-4 times daily until parturition. All birthsites were located for does ($n = 8$) that retained implant until parturition. Five fawns were located at or near these birthsites. Problems encountered included vegetative density, premature loss of implants, and movement of newborns from birthsites by does prior to arrival of researchers.

10:50 AM

Using Exogenous Hormones To Advance Estrus In White-Tailed Deer
David A. Osborn, Jonathan W. Gassett, Karl V. Miller, R. Larry Marchinton, and *Terry E. Kiser,* University of Georgia

The ability to manipulate timing of estrus may benefit captive deer breeding and research programs. Previous studies have demonstrated that estrus can be advanced in some deer species by administering exogenous hormones. To our knowledge, experiments involving white-tailed deer have failed to induce estrus in anestrus females. We administered melatonin, progesterone, and pregnant mare serum gonadotropin (PMSG) with hopes of inducing estrus in 4 adult female white-tailed deer with known reproductive histories. Each female received 2-12 mg melatonin implants (Prime-X®, Wildlife Pharmaceuticals, Inc., Ft. Collins, CO.) on May 25, June 15, June 29, July 17, and August 7, 1995. An intravaginal progesterone releasing devise (EAZI- breed CIDR®, Carter Holt Harvey Plastic Products, Hamilton, New Zealand) was inserted into each female on August 31 and removed on September 16. Each female was then injected immedately with 500 iu of PMSG. To monitor melatonin release rates, blood samples were collected biweekly during the first 4 weeks of melatonin treatment and then weekly until CIDR implantation. Pelage change and timing of estrus was monitored. One female molted to winter pelage by July 17 and all had molted by September 1. Two females experienced estrus on September 18 and maintained estrus for > 60 hrs. Earliest dates of first estrus for these females during the 4 previous years was October 18 and November 18, respectively.

11:10 AM

Empirical Testing of Transmission Genetics and Sire Determination Using a Panel of Microsatellite Loci
John C. Patton, LGL Ecological Genetics, *James C. Kroll* and *Ben Koerth,* Stephen F. Austin State University

Abstract-Ten microsatellite DNA loci were chosen for quality control testing in an effort to develop an automated panel of deer markers for use in management. Four markers which were developed for deer at Texas A&M University, three markers which were developed for cattle in the CSIRO labs in Australia, one marker which was developed for cattle at the University of Wisconsin, one locus which was developed for cattle at Texas A&M University, and one locus which was developed in the LGL laboratory, Bryan, Texas, were chosen for testing in this study. To stringently test transmission genetics, a panel of doe/fetus pairings were tested for all 10 markers. One locus was found to be X-linked and two loci were found to contain null alleles. These findings explain why these three loci had been previously reported to show reduced levels of heterozygosity relative to Hardy-Weinberg expectations. Once the transmission genetics were tested, a series of bucks from pen populations were tested to see if genetic assignment of sire agreed with predictions based on dominance. Little concordance was found between assumed sires and actual sires. This study represents the first quality control testing in deer for these 10 loci. This panel (not including the two loci found to have null alleles) holds promise as a start point for addressing a number of management oriented questions including assessment of genetic diversity, genetic subdivision, and paternity.

11:30 AM

Development and Implementation of a Geographic Information System for Deer in Minnesota
Dave R. Schad and *Steve Benson*, Minnesota Department of Natural Resources

In 1991, Minnesota initiated a project to acquire and develop spatial deer data , in addition to the traditional temporal data, and develop applications and processes using the spatial data to improve deer habitat and population management programs. A user needs assessment identified priorities for data development, and more than 40 spatial databases were acquired or developed. They included ecological data (areas important to deer ecology such as land features, habitat types, and wintering areas), administrative data (land designations that influence deer management objectives such as county and city boundaries, and public lands), programmatic data (deer management units, parks, and other DNR areas with varying deer management objectives), and landscape data (land use, land ownership, and other features that drive deer quality, quantity, and distribution). A project team determined staffing and contract needs; selection, purchase, and support of software and hardware; project supervision and oversight; and development of the operational program including data, applications, training, and system support. Applications that were developed included land management planning and evaluation (timber harvest planning, wildlife management area habitat planning), deer population management processes (assessment of population goals, harvests and densities, tracking deer damage complaints, and hunter management), and public information applications (summaries of deer populations attributes by management unit, and county records of quality deer information). The system has improved deer management decision-making, communication with the public, and cooperation between deer managers and other land managers.

11:50 AM

Using a Geographical Information System to Evaluate Deer Management Zones in Arkansas
Philip A. Tappe and *Robert C. Weih*, University of Arkansas, and *Michael E. Cartwright*, Arkansas Game and Fish Commission

Arkansas is currently divided into 20 zones in order to govern deer harvest regulations. We evaluated the appropriateness of these zones (number and locations) based on biological and sociological geographic data using a geographical information system (GIS). Data layers used in this analysis included the mean number of bucks, does, and button bucks harvested/county/year over a 10-year period; the mean number of estimated depredation complaints/county/year over a 10-year period; and the mean number of estimated road-killed deer/county/year over an 8-year period. U.S. Census Bureau data from 1990 (updated to 1992) was used to develop a human population density layer for the State. This data set is structured such that information is available at a sub-county resolution. Digital Line Graph (DLG) data (1:100,000) was used to develop spatial and attribute information for hydrography and roadway layers. A land cover layer was compiled using 1990 Advanced Very High Resolution Radiometer (AVHRR) time-series data. Several vegetation components were grouped into 11 landcover classes with a resolution of 1x1 kilometer. Layers for county and zone boundaries were also generated. Current zones were evaluated using statistics generated from overlaying the zone boundary layer on each of the historical deer data layers, and the human population density and land cover layers. Hydrography,

roadway, and county boundary layers were then used to facilitate the delineation of resulting zone boundaries.

Technical Session VII—Moderator: *M. Keith Causey,* Auburn University

1:30 PM

Growth of White-Tailed Deer Fawns Following Dietary Protein Restriction
Billy C. Lambert, Jr. and *Steve Demarais*, Texas Tech University, and *Eric Hellgren*, Oklahoma State University

Compensatory growth is defined as the faster rate of growth exhibited by stunted animals after the cause of the stunting has been removed. Although the general effects of nutritional deprivation in white-tailed deer are well documented, information concerning the ability of these animals to recover from nutritional deficiency is lacking. Research was initiated in 1994 to determine if yearling white-tailed deer can recover from nutritional stunting.

In October 1994, 56 white-tailed deer fawns, 34 female and 22 male, were weaned and randomly placed into three dietary treatment groups. Feeding treatments began in November 1994 after a 15 day adjustment period. Fawns in groups 1 and 2 were placed on diets containing 16% and 7% protein, respectively, for the duration of the study. Fawns in group 3 were initially placed on the 7% protein diet for 7 months, and then placed on the 16% protein diet. Except for the period of antler growth, deer were captured at 4- to 6-week intervals from October 1994 through October 1995 to monitor the effects of these treatments on growth and development. Antler development was measured in October 1995.

After 7 months of qualitative protein restriction, live body mass, hind-foot length, and chest girth were significantly smaller in both 7% protein groups. Stunted fawns in group 3 were placed on the 16% protein diet in June 1995 to stimulate growth recovery. By September 1995, no statistically significant differences were found in body weight, hind-foot length, and chest girth between treatments. An analysis of antler characteristics also revealed no significant differences in total number of points, basal circumference, main-beam length, greatest inside spread, and total antler weight. Preliminary analyses indicate that white-tailed deer fawns can recover from an early protein deficiency.

1:50 PM

Sodium Nutrition and Requirements of White-tailed Deer
William J. Pitts and *Eric C. Hellgren*, Texas A & M University—Kingsville

Sodium requirements of wildlife species are poorly understood, yet sodium is the mineral nutrient most commonly reported to be limiting for herbivore populations. Sodium deficiencies adversely affect reproduction, growth, and survival, yet there has not been a thorough study of the sodium requirements of any wild species except the meadow vole (*Microtus pennsylvanicus*). The objectives of this project were to determine the effects of varying levels of dietary sodium on growth and performance of young and adult male white-tailed deer (*Odocoileus virginianus*), and to determine the seasonal and annual

sodium requirements of young and adult male white-tailed deer. Eighteen male white-tailed deer were blocked according to age and body size and randomly assigned to 3 levels (0.025%, 0.1%, and 0.25%) of dietary sodium for 18 months. Body mass, feed intake, antler growth, and serum chemistry were monitored monthly to determine the effects of the dietary sodium levels. Four sodium balance trials were conducted to determine annual and seasonal sodium requirements. The results of the monthly sampling showed no difference in growth and performance between treatments, and suggested that the sodium requirements of white-tailed deer are above the lowest dietary treatment level. Preliminary analysis of the sodium balance data showed a strong positive relationship between sodium intake and urine output.

2:10 PM

Use of Calplex 50 to Enhance Agronomic Forage Production for White-Tailed Deer
Andreas Leidolf, *Robert Dew*, and *Harry A. Jacobson*, Mississippi State University

Food plots are a common feature of white-tailed deer (*Odicoileus virginianus*) management in the Southeastern United States. Researchers have shown in the past that fertilization of supplemental plantings can greatly increase the amount and quality of agronomic forage available to deer. We investigated whether production of agronomic forage and its utilization by deer could be increased by applying a liquid calcium chelate. We also studied the influence of this agent on selected soil properties. We used three different forage mixes of clover (*Trifolium sp.*) and wheat (*Triticum sp.*) and five different treatments with six replicates for each forage-treatment combination. Experimental plots were established on Starr Forest, Oktibeeha County, Mississippi. We assessed production and utilization from December through May using wire exclosures. We also examined eight soil sampling procedure. For each soil measure, we conducted a split plot ANOVA at $\alpha = 0.05$, with forage mix as a whole-plot effect and treatment as subplot effect. Overall forage production and utilization did not significantly differ among treatments ($P = 0.68$ and 0.85, respectively). Under the conditions tested we detected no benefits from Calpex 50 application.

2:30 PM

Establishment Cost of Forage Plantings for White-Tailed Deer Relative to Production
Neil A. Waer, *H. Lee Stribling*, and *M. Keith Causey*, Auburn University

Even though forage plantings have been used as a common management technique for white-tailed deer (*Odocoileus virginianus*) for many decades, researchers only recently have begun to critically evaluate their use to attract and/or supplementally feed white-tailed deer. Few current data exist regarding economics of forage plantings for sportsmen and wildlife managers to make informed management decisions. At the Piedmont Agricultural Experiment Substation in Camp Hill, Alabama, we compared establishment cost with timing of production from 1989 to 1993 using 9 warm-season and 39 cool-season forages. We measured forage production over time and calculated establishment costs by adding cost estimates (1994 dollars) of seed, fertilizer, lime, and use of equipment (tractor and implements to disk ground, spread seed, and cover seed). We then evaluated the forages regarding cost relative to production, nutritional quality, and deer preference. We found wheat, oats, and rye to be cost effective for attracting deer from autumn through winter (during hunting season). We found crimson clover and ryegrass to be cost effective from winter through early spring. Combining these forages with small grains

satisfies both needs of attracting deer during hunting season and supplying abundant, high-quality forage during the late autumn-winter stress period. From spring through summer, ladino and red clovers are very cost effective, especially if planted on high-quality sites that allow for perennial growth. We found soybeans, velvetbean, and peas to be cost-effective, warm-season forages. They produced abundant, desirable, low-cost forage of high quality throughout summer.

2:50 PM

Chinese Privet's Role in the Nutritional and Feeding Ecology of Deer in Northwestern Georgia
Karl A. K. Stromayer, Robert J. Warren, Albert S. Johnson, Carolyn L. Rogers, University of Georgia; *Chris L. Tucker,* Florida Game and Freshwater Fish Commission; and *Philip Hale,* University of Georgia

At the 1994 and 1995 Southeast Deer Study Group Meetings, respectively, we reported that white-tailed deer (*Odocoileus virginianus*) browsed Chinese privet (*Ligustrum sinense*) heavily in winter, and that dense stands of privet could be manipulated to produce high-quality winter forage. This year, we present the results of related longer-term studies. Macrohistological analyses of rumen samples from 185 deer collected on Chickamauga Battlefield Park (CBP), Georgia during 32 consecutive months revealed that privet was used more heavily than Japanese honeysuckle (*Lonicera japonica*) in 2 of 3 fall seasons and 1 of 3 winters. For all 3 years, total privet (forage plus fruit) averaged 11.1% and 13.3% of rumen volume during fall and winter, respectively. Privet fruit comprised 12 times more of rumen volumes during 1 fall typified by low acorn consumption (14.6%), compared to the other 2 fall seasons in which acorn consumption averaged 59.5%. These results suggest that privet fruit may serve as a buffer during years of acorn scarcity. Winter browse surveys conducted for 3 years revealed that privet browse comprised >50% of available browse, and that privet accounted for >75% of the browse diet. Crude protein (CP) analyses of privet forage collected during 1 annual cycle revealed that privet maintained CP levels above maintenance for deer in all months. Seasonal CP levels peaked in May (17.6%) and remained relatively high in winter (>12%). These results further emphasize why southeastern deer biologists should consider using privet in their habitat management efforts.

Technical Session VIII—Moderator: *Timothy E. O'Meara,* Florida Game and Fresh Water Fish Commission

3:40 PM

Survival and Growth of White-Tailed Deer Fawns Prematurely Weaned at 60 and 90 Days
Jacob L. Bowman and *Harry A. Jacobson,* Mississippi State University

Late fawning and early doe harvests in Mississippi (Archery season opens October 1) have led to concerns about the fate of fawns that are orphaned early in the season. Research has shown that 75% of fawns will only be 60 days of age by October 15. Thus, we prematurely weaned fawns ($n = 36$) in the captive deer research facility at Mississippi State University in 1994 and 1995. Fawns were randomly divided into three groups: 60 day weaned ($n = 12$), 90 day weaned ($n = 12$), and controls left with their does ($n = 10$). Measurements were taken on fawns at 7 months of age to look for differences between three body measurements. In 1994, no differences were detected between the 3 groups for crown-rump

measurements ($P = 0.3785$), shoulder-ground ($P = 0.7329$), and weight ($P = 0.6074$). Survival rates between the three groups also were not significant ($P = 0.9320$). Thirty-four fawns were used in the survival analysis, only the animals surviving to treatment time were considered. The control, 90 day, and 60 day groups had the following respective survival rates 45%, 60%, and 54%. Thirty-two fawns were again divided into treatments in 1995 and comparisons will be presented.

4:00 PM

Observations of Mortality and Emigration in a Coastal South Carolina Population of White-Tailed Deer

James H. Dozier, III, *Tim Fendley*, and *Kieth Morgan*, Clemson University; *Wallace Roberts*, Westvaco, Inc., *Derrell Shipes*, South Carolina Department of Natural Resources; and *Elizabeth Turner*, Clemson University

Effective management of white-tailed deer (*Odocoileus virginianus*) populations requires a knowledge of the factors affecting mortality and emigration rates. This paper presents findings from a three year telemetry study investigating age- and sex-specific mortality and emigration rates in a population of deer under restricted hunter harvest. Deer equipped with radio-transmitters were monitored daily to detect mortality and emigration. In the first year of the study, 44 deer were monitored from 2 January 93 to 1 January 94. Overall annual mortality for the first year of the study, in which there was extensive heavy flooding, was 36% (16 of 44). Fifty-six percent (9 of 16) of these were non-harvest mortalities, and 44% (7 of 16) were harvest mortalities. Six (86%) of the harvest mortalities occurred off-site. Eleven percent (5 of 44) of the monitored deer established stable off-site ranges during the study. During the second year of the study, 61 deer were monitored from 2 January 94 to 1 January 95. Overall annual mortality for the second year of the study was 21% (13 of 61). Forty-six percent (6 of 13) of these were non-harvest mortalities, and 54% (7 of 13) were harvest mortalities. Three (43%) of the harvest mortalities occurred off-site. Ten percent (6 of 61) of the monitored deer established stable off-site ranges during the second year of the study. During the third year of the study, 52 deer were monitored from 2 January 95 to 1 January 96. Overall annual mortality for the third year of the study was 25% (13 of 52). Twenty-three percent (3 of 13) were non-harvest mortalities and 77% (10 of 13) were harvest mortalities. Two (15%) of the harvest mortalities occurred off-site. Eight percent (4 of 52) of the monitored deer established stable off-site ranges during the third year of the study.

4:20 PM

Pooling Mandibles into Separate Age Classes Significantly Increases Precision of Age Estimates

Grant R.. Woods, Woods and Associates, *Micah Goldstein*, Georgia Pacific Corporation; and *Robert A. Schorr*, University of Georgia

Condition indices and harvest models for white-tailed deer are dependent on age data. Substantial variance among age estimates is possible when multiple biologists age mandibles. However, pooling mandibles into year classes decreases variance. To measure the significance of the *pooling technique*, a test was devised using pairs of mandibles from 20 deer harvested during the 1994 state regulated hunting season at the Joseph W. Jones Ecological Research Center, Baker County, Georgia. These 20 pairs of mandibles were aged by a committee of biologists, and a mandible from each deer was assigned to one of

two test groups. Group A was presented in random order and Group B presented in ascending order based on estimated age. Participants at the 1995 Southeast Deer Study Group Meeting were randomly assigned to begin with either Group A or Group B and asked to age the mandibles. The variance of estimated ages for each mandible increased with age of the mandible. The committee's and the mode of the participants' estimated ages for mandibles in Group B were identical. However, the mode response of the participants' that had previously aged 1,000+ mandibles was different for 15% (3 of 20) of the mandibles in Group A compared to Group B. The mode response of the participant's that had previously aged fewer than 500 mandibles was different for 35% (7 of 20) of the mandibles compared to Group B. Clearly, the pooling technique increases the precision of age estimates by both experienced and inexperienced individuals.

4:40 PM

Reproductive Characteristics of Missouri White-tailed Deer
Jeff J. Beringer and *Lonnie P. Hansen*, Missouri Department of Conservation

We measured reproductive parameters from 2,833 white-tailed deer (*Odocoileus virginianus*) does collected from 1978-86 and 1989-93 in 3 geographical regions of Missouri. Fawn pregnancy and fetal rates were significantly lower than those of yearling and older does. Ozark region fawns had lower pregnancy and fetal rates than fawns from the Glaciated Plains region; no other regional differences were found. The only annual difference for any age class was for fawns between 1992 and 1993. Overall sex ratios were near 1:1 and there were no significant relationships between sex ratios and year of collection, litter size, region, or age of doe. Analysis of conception dates indicated that fawn does bred later in the fall than yearling or adult does but there were no regional or annual effects on mean conception dates. Most (75%) of yearling and adult breeding occurred during a 2 week period while 75% of fawn breeding covered 7 weeks. These results indicate that little annual variation in fecundity occurred during the 14-year study for yearling and adult does. Fawn reproductive rates were more variable suggesting that periodic monitoring of fawn reproduction is warranted.

APPENDIX I
STATE NARRATIVES

ALABAMA

Alabama is rivaled by few other areas of comparable size when one considers the diversity of plant and animal life. 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, separating the Coastal Pain to the south from the older upland provinces of the north and northeast. Elevation ranges from sea level to 2,407 feet. Several major rivers and tributaries dissect the state, further adding to the diversity of the habitat.

The Coastal Plain provinces include the Lower Coastal Plain, Red Hill, Black Belt and Fall Line Hills. The soils of the Coastal Plain vary from sands and sandy loams to heavy calcareous alkaline types. Streams are sluggish with broad, low floodplains and numerous sloughs and oxbows. Swampy habitats are fairly common. Land use is intensive agriculture, pasture and forest land with pine, pine hardwood and bottom land hardwood timber types. Much of the suitable forested pine growing land has been converted to even age pine stands. The upland regions above the Fall Line include the Piedmont, Blue Ridge, Ridge and Valley, Appalachian Plateau, Tennessee Valley and Chert Belt. The soils of the upland regions are mostly well drained and vary from clays to sand with gravelly and rocky phases common. Rock formations vary from sandstone in the northeast to shale, limestone and chert in the south. The ecology of the upland regions favors pines on ridge tops and hardwood along lower slopes and bottomlands. Intensive agriculture, reforestation with loblolly pine, strip-mining, industry and the increasing population has negatively altered habitats for all wildlife in a significant part of the upland regions.

Historically, deer were abundant until unrestricted hunting and land use changes reduced their numbers to only a few thousand in a few isolated localities around 1900. The Game and Fish Department began cooperative restocking of suitable habitat as early as 1925; and with growing public support, the Department accelerated restocking effort though the 1960's. Today, all counties have a deer population and a deer season. The current statewide preseason population estimate is 1.5 million. South and south central Alabama support the greatest abundance of deer and command the highest lease fees paid for deer hunting. Most counties have a 75-day gun season with a one-antlered buck per day limit. Since nearly all lands in Alabama are privately owned, the long season and liberal bag limit extend the deer hunting opportunity. Age structure on harvested bucks is rather low except on the more intensively managed lands. Approximately 70% of the state has a limited hunter choice season, usually not exceeding 10 days.

In 1984, Alabama initiated a Deer Management Assistance Program (DMAP) to assist the private sector with management of their deer herd. Interest gradually grew to include 1500 participants and 3 million acres by 1991. In 1992, a fee will be charged for participation in the DMAP. Through the DMAP and dissemination of other information, hunters are increasingly more aware of management requirements for improving deer quality. Alabama is continuing to lose public hunting land and open permit land to private lease. In November of 1992, Alabama voters will have an opportunity to approve and amendment to the Constitution allowing a Forever Wild Trust to acquire land for public recreation and state operated WMA's.

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 2 primary regions; the Interior-Highlands (Ozark and Ouachita Mountain 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. The state is still classed as rural with a total human population 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 about 500 deer statewide in 1930. The Arkansas Game and Fish Commission began an aggressive deer restoration program in the 1920's, 30's, and 40's, 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 and estimated population size of about 300,000. Legal harvest increased from 540 deer taken in 1939 to a record harvest of 122,063 taken in 1993.

Today, the herd is somewhat stable with an estimated pre-hunt population of 800,000. 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, poor antler development, and poor age and sex distribution. A high percentage of young bucks occur in the antlered segment of the population. 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. 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 hunting seasons, either-sex hunting days during the modern firearm season (primarily antlered only season) and quota antlerless permits. Management efforts are directed toward increasing the antlerless harvest and reducing the antlered harvest in high deer population areas such as the West Gulf Coastal Plain division. A more conservative antlerless harvest strategy is being taken in the remainder of the state where lower deer populations occur. Many of the state-owned or controlled wildlife management areas operate under a quota either-sex or antlerless permit program which allows for controlled harvest and proper herd management.

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, and 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 exceed 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 model) has declined 1.26 million in 1990-91 to 985,190 in 1994-95. This decline has been by design by 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 1 million in 1986-87. This expansion continued though 1990-91, even though either-sex hunting opportunities were increased annually. The increased removal of does began to decrease the population in 1991-92 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. In addition, prior to the 1991-92 hunting season, the statewide bag limit was increased from three - with no more than two antlered bucks. Either-sex days began increasing in the Coastal Plain province in the 1990-91 season. 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 have increased from 32.2% in 1987-88 to 51.2% in1993-94. As a result, the population has been reduced slightly below the goal established in 1990 of 1 million.

These efforts to reduce the population have been successful; however, they have presented a new challenge not previously faced by wildlife agencies in the southeast - 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. This is where the challenge lies. 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. As the old saying goes - time will tell.

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 agriculture 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 can not 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, Quachita, 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 Wildlife and Fisheries Commission 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 seventies, deer herds continued to increase, resulting in a need for sound deer management programs. In the late seventies, LDWF began to assist hunting clubs and landowners with their deer management problems and needs.

The Wildlife Division of LDWF is divided into seven 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 production in the extreme western portion of the state, to extensive farming in the central and eastern regions, and the pine forest in the Chesapeake Bay region and coastal region. Maryland has one of the largest percentages of urban dwellers in the country. This large urban population lives on 15% of the land. The presence of this large human population places stress on the remaining 85% of Maryland for agriculture and recreational activities. These land use pressures have resulted in a loss of deer habitat (88,000 acres of woodland loss from 1985-1990) and will continue to affect how the Maryland deer herd will be managed in the future.

Despite our large human population of 4.9 million people, the Maryland deer herd continues to expand. This expansion began in the early 1900's when deer from the Aberdeen Proving Grounds were introduced throughout the state. Western Maryland experienced its first deer season in the 1920's. Mandatory check stations were instituted in 1931. That year, thirty-one deer were checked in the Western Maryland counties of Allegany and Garrett. By 1960, deer hunting was state-wide, except for Montgomery County.

During 1994, the state-wide deer kill should total about 50,000 plus deer. Maryland had its first antlerless deer season in 1957. At present, both sexes are legal during our three seasons: Archery - 9/15 to 1/31, Firearm - 12 days, and Muzzleloader - a 3-day early segment in October and a 2-week segment in the regular muzzleloader season. Antlerless permits are required only in the 3 Western counties. Three of these counties have deer zones in which antlerless permits are issued accordingly. Antlerless permits are issued in these counties due to high hunting pressure and the possibility of an extremely high harvest.

The deer density is greatest in the western panhandle counties, where 31% of the statewide harvest occurs. The metropolitan and suburban areas, Maryland's most developed section, have the fastest growing deer population. This has created and urban deer population with the associated problems that other eastern states are experiencing. We are beginning to initiate an urban deer management program to reduce the complaints from municipal watershed managers, farmers, suburban landowners, etc. In the future, managing our urban deer population is going to be the Maryland Wildlife Division's greatest challenge.

MISSISSIPPI

Mississippi contains 8 major soil regions that vary greatly in fertility and use. Predominate land uses are forestry and agriculture. Forests, which occupy 55% of the state include natural stands of hardwoods, pines, mixed pine-hardwood, and plantations of primarily pine. The majority (69%) of the forestlands are owned by private non-industrial landowners and about 10% is in public ownership. Primary agricultural crops are soybeans, cotton, sorghum and rice.

The history of the white-tailed deer in Mississippi has been very similar to that in many other southeastern states. Despite some sporadic attempts at protection in the late 1800's and early 1900's, the white-tailed deer was almost completely eliminated from the state. In 1929, Aldo Leopold reported that only small herds remained in limited parts of the Mississippi Delta and in the Pearl and Pascagoula River Swamps. The Mississippi Game an Fish Commission was established by the State Legislature in 1932 and by 1940 a deer restoration project, funded principally by Pittman-Robertson moneys, was well underway. Deer were translocated from other states including North Carolina, Texas and Mexico to refuges in Mississippi. Due to these restoration efforts coupled with strict law enforcement the state's deer herd has experienced tremendous growth and is now estimated at 1,750,000 animals. There are currently 139,000 resident deer hunters who harvested approximately 262,000 deer during the 1993 season.

With the success of Mississippi's deer restoration program came complex resource and people management problems. Through a cooperative research program with Mississippi State University, initiated in 1976, the Mississippi Department of wildlife, Fisheries and Parks has gained information useful for both public and private needs in deer herd management.

Even though antlerless harvest was first allowed on private clubs as early as 1960, many hunters in Mississippi are resistant to following currently accepted, scientifically based harvest recommendations of biologists. Therefore, deer management in the state ranges from intensive "quality deer" strategies to bucks-only harvest on some areas. Much of the antlerless harvest and management objectives are currently being accomplished through the very successful Deer Management Assistance Program (DMAP). In 1990 there were about 900 cooperators on the program encompassing 2.3 million acres. The harvest ratio of antlered to antlerless on DMAP is about 1:1 while on a statewide basis antlerless deer make up only about 29% of the total harvest.

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 and 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, it's 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, and 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 1994 pre-season population estimate was 800,000 deer. In the Coastal Plain, densities and buck harvests have stabilized somewhat and there have been accompanying increases in doe harvests (almost 40% of the total). Piedmont herd 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.

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 1518 m at Black Mesa in the panhandle to 99 m 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 Quachita, Boston, and Ozark Mountains along the eastern border. Average annual precipitation ranges from a low of 38 cm in the panhandle to 115 cm in the southeast part of the state.

Four major forest types cover approximately 20% of the state. The most extensive forest typed is the postoak-blackjack 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 to 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 animal 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, 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 harvest four of the past five years.

SOUTH CAROLINA

The statewide deer harvest of 142,795 deer represents and actual count of the number of deer killed. These data were provided by hunters at Department operated check stations and from cooperating club data. It appears to contrast the other states' information which is derived from postal surveys or hunter reports. However, it should be pointed out that South Carolina's harvest represents an absolute minimum number.

Deer hunting in South Carolina is characterized by two distinct season frameworks. The Upper and Lower Coastal Plain encompasses 28 counties where the deer season begins on august 15, September 1, or September 15 and continues until January1. In this area, dog hunting is allowed, however, this activity is declining significantly. The antlerless deer harvest in the 28 county region is controlled by an antlerless deer quota program whereby, tags are issued to tracts of land based upon the biological needs of each area. It is important to note that the deer season and method of antlerless harvest in the Coastal Plain is controlled by the State General Assembly through statutory control.

In the Piedmont and Foothills of South Carolina (18 counties), the season framework is controlled by Department regulatory authority. In this area, the deer season begins on October 1 for primitive weapons and October 11 for modern firearms and continues until January 1. Antlerless deer harvest is facilitated in this area using either-sex days and an antlerless tag program.

South Carolina's deer herd reached and extremely low point at the turn of the century and disappeared completely from the Piedmont and Foothills. Restoration efforts began in the early 50's and deer were restored to all of the Piedmont and Foothills. Huntable populations currently exist in all 46 counties.

Current Department objectives include stabilization or reducing the deer population in most areas of the state. Changes will include efforts to increase the antlerless harvest while offsetting some of the harvest of antlered bucks.

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 acreage for a small fee ($15-$20).

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 700,000. The deer harvest has grown accordingly, from 113 in 1949 to over 113,000 in 1990.

Deer management in Tennessee is conducted on a unit basis, with 3 major units. Unit A comprises the middle and western counties of the state and has the longest seasons and the most liberal bag limits. Units B and C comprise the eastern counties and have 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 40% of the total harvest in 1990.

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 are increasing in the state, and will have to be addressed in the near future.

TEXAS

Texas is divided into 10 distinct or vegetational areas. The Pineywoods contains gently rolling to hilly forested land in the eastern part of the state. Commercial forestry is practiced throughout the area. The Gulf Prairies and Marshes is located along the Texas coast and is a nearly level, slowly drained plain less than150 feet in elevation. Most of the area is grazed by cattle. The Post Oak Savannah is a gently rolling to hilly area with elevations of 300 to 800 feet. The overstory is primarily post oak and blackjack oak. Many brush and weedy species are common. The Blackland Prairies are gently rolling to nearly level and maintain rapid surface drainage with most of the area devoted to agricultural crops. The Cross Timbers an Prairies is a rolling to hilly region, deeply dissected and with rapid surface drainage. The East and West Cross Timbers range from open savannah to dense brush. The South Texas Plains area is level to rolling, and the land is dissected by streams flowing into the Gulf. Most of the area is dominated by dense brush. Land holdings predominantly are large cattle ranches. The Edwards Plateau or "Hill Country" is a hilly area in west-central Texas which is predominantly rangeland. The Rolling Plains area is gently rolling to moderately rough and 65% rangeland. The High Plains is a relatively level high plateau north of the "Hill Country". The Trans-Pecos area in the extreme western part of Texas consists of mountains and arid valleys. It is a region of diverse habitats and vegetation, varying from desert valleys and plateaus to wooded mountain slopes.

Indiscriminate slaughter by commercial meat and hide hunters and ignorance of the deer's habitat requirements caused the near extirpation of white-tailed deer in Texas near the end of the 19th century. Public concern prompted a series of protective measures by the legislature near the turn of the century. A five-month closed season during which deer could not be hunted was enacted in 1881. A bag limit of 6 bucks per season was established in 1903, but was reduced to 3 bucks in 1907. Hunting licenses were first issued in 1909, with 5,000 being sold that year. In 1919, 6 game wardens were hired to patrol the entire state. Whitetails increased in numbers and distribution during the 1930's and1940's. The increase resulted from several factors: protection from illegal and commercial exploitation; exclusion of fire; invasion of woody plant species into the grasslands; deer restocking; and interest and cooperation shown by hunters, landowners, and the general public. During the late 1950's and 1960's, deer populations reached very high levels and extended their ranges into almost all suitable habitat throughout the state.

The white-tailed deer occurs in all 10 ecological areas of Texas, occupying over 71 million acres of range. Current estimates place the total population at 3.4 million, with the species being most abundant in the Edwards Plateau (48% of statewide total), South Texas Plains (17%), and Pineywood (12%). In 1993, 593,000 hunters harvested a total of 453,000 white-tailed deer, expending 5.5 million days of hunting effort. In terms of hunting recreation furnished, the white-tailed deer ranks highest of all game species in the state. This species also generated the highest response among the non-hunting public for overall viewing interest as compared with other wildlife according to a recent public survey.

Since 97% of the land is privately owned, landowners are the key to healthy white-tailed deer populations in Texas. How they manage the vast amount of land they control for other uses, such as livestock production, will continue to determine the amount and quality of habitat for whitetails. Simultaneously, the extent to which they permit access to hunters will determine the number and condition of whitetails on given ranges.

VIRGINIA

The statewide deer harvest during the 1994-95 hunting season was 209,373 (120,360 males, 87,530 females (42.1%), and 1,483 deer of unrecorded sex). The archery and muzzleloading harvests were 18,700 (8.9%) and 31,090 (14.8%), respectively. Of the 209,373 deer harvested in Virginia, 185,568 (89%) were harvested on private land(s) and 20,186 (10.0%) were harvested on public land(s). Harvest data in Virginia represent an actual known minimum count. Data are obtained through mandatory tagging and subsequent checking at one of about 1,400 check stations located statewide. Check stations are operated by volunteer operators.

Deer season in Virginia begins with an approximately 7-week either-sex archery season that begins the first Saturday in October. Concurrent with the last two weeks of the archery season is a statewide two-week early muzzleloading season. The early muzzleloading season is full season either-sex east of the Blue Ridge Mountains and one-day either-sex west of the Blue Ridge. General firearms deer hunting, which begins the third Monday in November, is characterized by two distinct season frameworks. East of the Blue Ridge Mountains, the firearms season runs to the first Saturday in January. West of the Blue Ridge and in the southwestern Piedmont, the firearms season is 12 days in length. During the firearms season, either-sex deer can only be taken on prescribed either-sex days. There is a standard statewide bag limit for all deer hunters (archers, muzzleloaders, and general firearm hunters) of two deer per day, three per license year, one of which must be antlerless. Unlimited bonus deer permits (one either-sex and one antlerless only) allow hunters to exceed the season bag limit statewide on private land only.

Virginia's two private land deer management programs, the Deer management Assistance Program (DMAP) and the Damage Control Assistance Program (DCAP), initiated during the 1988-89 season, continue to achieve wide acceptance. During the 1993-94 hunting season, there were 323 DMAP cooperators encompassing 1,016,968 acres in 75 counties. These DMAP operators were issued a total of 13,160 antlerless tags and reported a harvest of 13,040 deer. Also during the 1993-94 hunting season, there were 679 DCAP cooperators comprising 329,426 acres. These DCAP cooperators were issued 16,947 antlerless permits and reported a harvest of 4,519 deer (637 of 679 reporting).

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 is 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 at 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 percent of the timberland..

Fertile soils are relatively uncommon in the state, so where they so 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 Virginina.

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 250,000 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 surplus animals from the Wildlife Center.

West Virginia sportsmen have experienced just about every type of season imaginable in the past, from bucks-only, to hunters-choice, to permit hunting. It wasn't until 1968, when unregulated hunter-choice seasons were curtailed, that the deer herd began to rebound at a tremendous rate to its' present day population. Twenty years ago, West Virginia's deer harvest totaled 25,863 animal under archery and bucks-only regulations. In 1993, West Virginia sportsmen harvested 169,014 deer under a lengthy archery, 12-day bucks-only, 3-day antlerless and 6-day muzzleloader seasons. In 1970, the bag limit was 2 deer. Today, resident hunters may take as many as 7 deer. West Virginia offers a wonderful opportunity for deer hunter recreation, and with a progressive program, deer hunting in the Mountain should remain excellent in the future.

APPENDIX II
STATE DEER HARVEST SUMMARIES

Table 1. Southeastern deer harvest summaries, 1994-95.

State	Land Area (sq. mi.)	Deer Habitat (sq. mi.)	Deer Habitat (% Total)	Percent Forested	Deer Range Unoccupied	% Land Area Public Hunting	1994-95 Harvest Male	1994-95 Harvest Female	1994-95 Harvest Total*
AL	51,628	48,014	93%	66%	None	2.0%	228,390	102,610	331,000
AR	52,609	44,677	85%	53%	None	12.0%	85,869	34,627	120,491
FL	51,628	29,280	57%	45%	<1.0%	16.0%	NA	NA	84,408
GA	57,800	33,298	58%	58%	None	6.0%	179,291	167,562	346,853
KY									
LA	41,406	26,562	64%	52%	None	7.5%	108,327	112,748	221,075
MD	9,874	8,936	91%	43%	None	4.0%	34,014	16,437	50,451
MS	47,296	31,250	66%	55%	None	6.0%	193,733	116,447	310,100
MO	69,561	21,396	31%	31%	None	4.3%	110,041	71,034	181,075
NC	48,794	36,699	75%	62%	None	6.0%	123,300	63,500	186,800
OK	69,919	22,837	33%	19%	None	2.0%	43,032	17,167	60,199
SC	30,207	27,186	90%	63%	None	7.0%	71,558	62,608	138,965
TN	42,246	25,770	61%	49%	None	8.5%	93,569	38,860	132,429
TX	262,017	110,938	42%	40%	<10%	<2%	252,077	169,346	421,423
VA	39,678	31,487	79%	63%	None	8.1%	120,360	87,530	209,373
WV	24,064	22,882	95%	79%	None	9.0%	99,692	47,610	147,604

*Total includes deer of unknown sex.

Table 1. (continued)

State	Harvest/mi^2 Occupied Habitat	Method of Data Collection*	Estimated Pre-season Population	Length of Season (Days)			Method for Setting Seasons	% Land Area Open to Dog Hunting
				Archery	Black Powder	Firearms		
AL	6.9	2	1,500,000	109	7	74	2	70%
AR	2.7	1,4	800,000	151	21	36	1,2	81%
FL	2.9	2	N/A	30	3	72	1,2	75%
GA	11.8	1,2,3,4	1,038,700	35	51-79	51-79	1,2,3	10%
KY								
LA	8.3	1,2,3	850,000	114-123	7	14-69	1,2,3	80%
MD	5.6	1,2,3	200,000	87	16	13	1	None
MS	9.9	1,2,3	1,750,000	62	14	47	1,2,3	99%
MO	8.5	1	750,000	83	18	9	1,2	None
NC	5.1	1,2,3,4	800,000	24-54	6	18-67	1,2,3	53%
OK	2.6	1,3	325,000	78	9	9	1,2	None
SC	5.1	1,3	750,000-1,000,000	10	10	60-140	1,2,3	60%
TN	5.1	1,4	850,000	23-38	9-14	16-34	1,2,3	None
TX	3.8	2	3,600,750	31	9	9-65	1,2	None
VA	6.7	1,2,3,4	850,000	43-73	12-24	12-42	1,2	55%
WV	7.4	1	800,000	67	6	15	1,2,3	None

* 1-Check station; 2-Mail survey; 3-Jawbone collection; 4-Computer models.

** 1-Harvest and biological data; 2-Department/Commission regulatory authority; 3-Legislative

Table 1. (continued)

State	No. Deer Hunters	5-Year Trend	License Fees		% Hunting Success		Typical Fine Illegal Deer	Average Leasing Fees/Acre
AL	211,000	Stable	$16	$200	4%	40%	$500	$2-10
AR	250,000	Stable	$11.50-26	$95-185	N/A	N/A	$150-1,000	$2-4
FL	105,712	Down	$11	$150	N/A	N/A	$250-500	$3.50
GA	349,746	Down	$19	$177	30%	110%	$500	$2-10
KY								
LA	181,400	Stable	$21-42	$96-212	33%	53%	$725	$3
MD	103,000	Down	$24.50	$120.50	30%	40%	$500	$5-25
MS	172,267	Stable	$17-32	$105-225	44%	61%	$100-250	$1-5
MO	400,000	Up	$10-12	$75-100	17%	36%	$200-300	$1-2
NC	285,000	Up	$25	$80	N/A	47%	$150	$2-5
OK	205,778	Stable	$29.75	$201	17%	27%	$500-1000	$2-5
SC	157,000	Up	$18	$155	N/A	N/A	$200	$2-4
TN	188,501	Up	$35	$105-156	25%	28%	$50-500	$1-5
TX	587,800	Stable	$13	$250	15%	54%	$25-500	$2.75-8.25
VA	240,000	Down	$25-50	$122-174	27%	54%	$50-850	N/A
WV	300,000	Stable	$25	$80	20%	40%	$282-562	$1-5

Table 1. (continued)

State	Mandatory Hunter Education	No. Fatal Hunting Accidents		Mandatory Blaze Orange	Handguns Permitted	Crossbows Permitted	Drugged Arrows Permitted	Highway Kill (minimum)
		All	Deer					
AL	Yes	8	7	Yes	Yes	Handicap	No	3,000
AR	Yes	7	5	Yes	Yes	Yes	No	6,456
FL	Yes	NA	NA	Yes	Yes	Yes	No	N/A
GA	Yes	5	5	Yes	Yes	Handicap	No	44,000
KY								
LA	Yes	12	5	Yes	Yes	Handicap and 60 yr. or over	No	2,000
MD	Yes	2	1	Yes	Yes	Handicap	No	3,425
MS	Yes	6	4	Yes	Yes	Handicap and 65 yr. or over	Yes	N/A
MO	Yes	5	3	Yes	Yes	Yes	No	8,384
NC	Yes	5	4	Yes	Yes	Handicap	No	4,000
OK	Yes	3	3	Yes	Yes	Handicap	No	N/A
SC	Yes	8	8	Yes (18 co.)	Yes	Yes (28 co.)	Yes (28 co.)	4,799
TN	Yes	3	2	Yes	Yes	Handicap	No	N/A
TX	Yes	5	2	No	Yes	No	No	N/A
VA	Yes	10	7	Yes	Yes	Handicap	No	N/A
WV	Yes	6	2	Yes	Yes	No	No	8,567

Notes:

The 19th Annual Meeting of the Southeast Deer Study Group wishes to thank the following organizations and individuals for contributing merchandise and/or services:

A. Duda & Sons, Rockledge, FL
Addison's Gun Shop, Kissimmee, FL
Bacardi Imports
The Brunton Company, Riverton, WY
Buck Knives Inc., Cajon, CA
Bulleye, Inc., Brooksville, FL
Bushnell Saw Mill, Bushnell, FL
Lorene and Tommy Clay, Grandin, FL
Deer and Deer Hunting Magazine, Iola, WI
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Florida Game & Fish Magazine, Marietta, GA
Florida Wildlife Magazine, Tallahassee, FL
The Game Tracker, Flushing, MI
Haydel's Game Calls, Bossier City, LA
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Mike's Gun Shop, Jay, FL
NAPA Auto Parts, Brooksville, FL
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Ms. Sandra Kaupe, West Palm Beach, FL
Shannon Outdoors, Inc., Winnsboro, SC
Simmons Inc.
Tallahassee Sports and Recreation
United States Air Force
U.S. Fish and Wildlife Service, Division of Federal Aid
Week's Hardware, Brooksville, FL

Committees

1996 Program Chairman
Robert Vanderhoof

Program and Agenda
Gabrielle Matthews, Tim O'Meara, Steve Shea, Robert Vanderhoof

Registration
Mark Banker, Ginger Gornto, Wayne Harris, Rick Horton, Gabrielle Matthews, Paul Schulz, Paula Strow, Robert Vanderhoof, Linda Zussy

Technical Sessions
Mark Banker, Gabrielle Matthews, Jeff Norment, Steve Shea, Robert Vanderhoof

Fund Raising
Jeff Andree, Steve Coughlin, Richard Crossett, Shane Fuller, Richard Hanas, David Johnson, Larry Martin, Chuck McKelvy, Jeff Norment, James Oehler
Tim Regan, Paul Schulz, Steve Shea, Gordon Spratt, Steve Stafford, Robert Vanderhoof, Tom Wright

Social Events and Entertainment
Steve Coughlin, Chuck McKelvy, Gordon Spratt, Robert Vanderhoof

Exhibits
Mark Banker, Bill Frankenburger, Don Francis, David Johnson, Stan Kirkland, Tim Regan, Paul Schulz, Gordon Spratt

Field Trips
Steve Coughlin, Jeff Andree, Gordon Spratt

Transportation
Steve Coughlin, Gordon Spratt, Robert Vanderhoof

Hotel Arrangements
Jeff Andree, Steve Shea, Gordon Spratt, Robert Vanderhoof