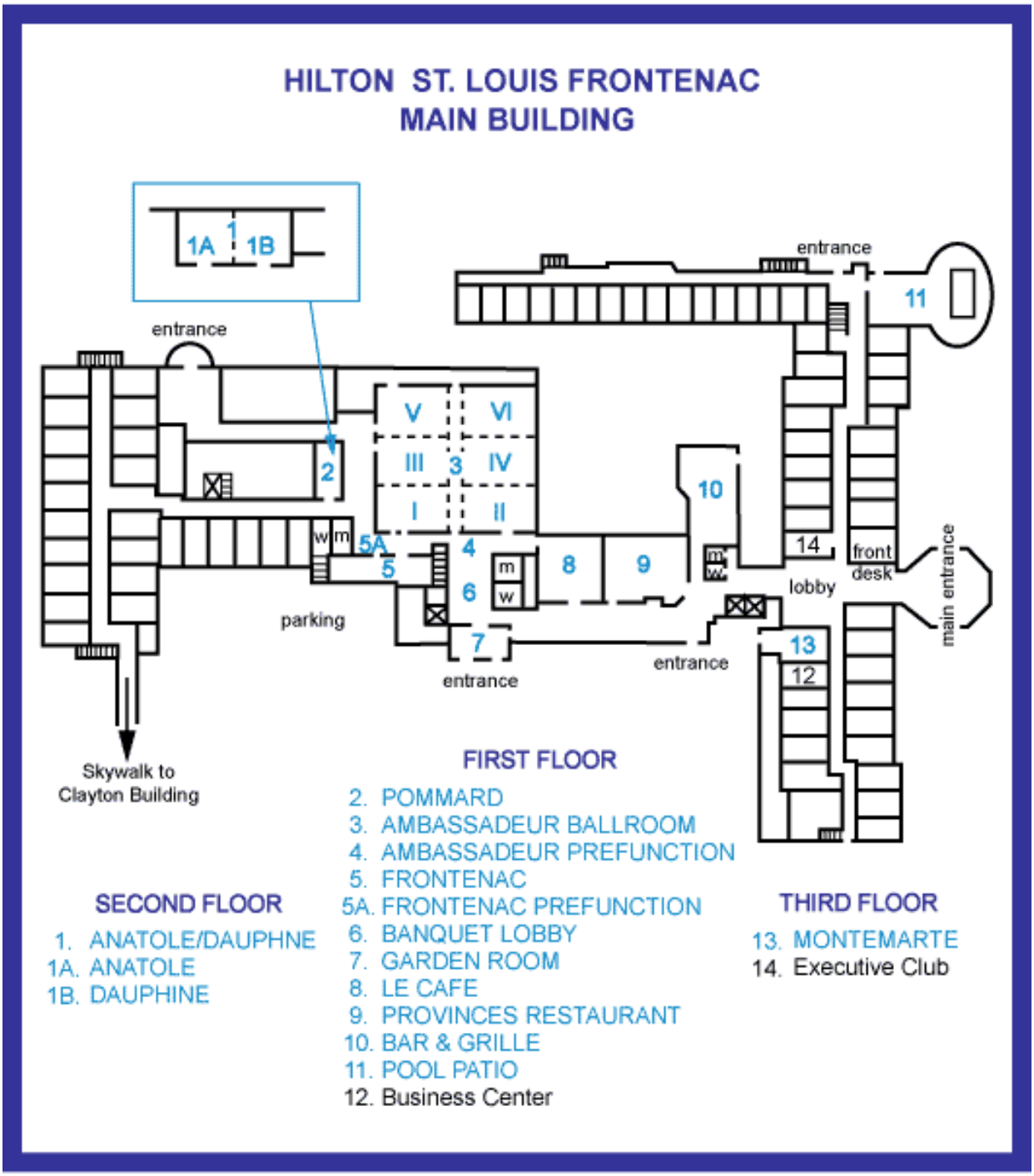
40th Annual Meeting of the Southeast Deer Study Group

Disease: Science, Politics, Management

February 27-March 1, 2017
St. Louis, Missouri

Hosted by



The Clayton Ballroom is located in the Clayton Building next door.

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Hosted by the Missouri Department of Conservation

WELCOME & ACKNOWLEDGMENTS

The Missouri Department of Conservation welcomes you to the **40th Annual Southeast Deer Study Group Meeting** in St. Louis, Missouri.

We would like to thank the North Carolina Wildlife Resources Commission who hosted last year's meeting, the Missouri Chapter of The Wildlife Society, as well as all of the sponsors for their generous contributions to this meeting; see complete listing on pages 70 - 76.

2017 Southeast Deer Study Group Meeting

Planning Committee Co-Chairs Barbara Keller Charles Anderson	
Scott Corley	Chris Morrow
Kim Devine	Erin Shank
Jeff Esely	John Vogel
Aaron Hildreth	Kevyn Wiskirchen

Additional Support	
Jennifer Fakes	Tom Rizzo QDMA
Alex Foster QDMA	Brian Towe QDMA
Larry Lueckenhoff Missouri Show-Me Big Bucks Club	Jonathan Shaw North Carolina WRC
Steve Noll	Dan Vogt Whitetails Unlimited

ABOUT SEDSG

The Southeast Deer Study Group

The Southeast Deer Study Group was formed as a subcommittee of the Forest Game Committee of the Southeastern Section of The Wildlife Society. The Southeast Deer Study Group Meeting is hosted with the support of the directors of the Southeastern Association of Fish and Wildlife Agencies. The first meeting was held as a joint Northeast-Southeast Meeting at Fort Pickett, Virginia, on September 6-8, 1977. Appreciating the economic, aesthetic, and biological value of the white-tailed deer 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. A list of the meetings, their location, and theme are listed on the following pages. These meetings provide an important forum for the sharing of research results, management strategies, and discussions that can facilitate the timely identification of, and solutions to, problems relative to the management of white-tailed deer in our region. The Deer Subcommittee was given full committee status in November 1985 at the Southeastern Section of The Wildlife Society's annual business meeting. In 2006, Delaware was approved as a member.

TWS Professional Development

The 40th Annual Southeast Deer Study Group meeting can be counted as contact hours for Professional Development/Certification. Each hour of actual meeting time counts as one credit hour (no social time credit). For more information about professional development, visit The Wildlife Society website, www.wildlife.org.

Qualifying Statement

Abstracts in the proceedings and presentations at the Southeast Deer Study Group meeting often contain preliminary data and conclusions that have not undergone the peer-review process. This information is provided to foster communication and interaction among researchers, biologists and deer managers. Commercial use of any of the information presented in conjunction with the Southeast Deer Study Group Annual Meeting is prohibited without written consent of the author(s). Electronic versions of this and previous proceedings are available at www.sedsg.com.

Participation of any vendor/donor/exhibitor with the Southeast Deer Study Group Annual Meeting does not constitute nor imply endorsement by the Southeast Deer Study Group, the SE Section of The Wildlife Society Deer Committee, the host state, or meeting participants.

Southeast Deer Study Group Meetings

Year	Location	Meeting Theme
1977	Fort Pickett, VA	none
1979	Mississippi State, MS	none
1980	Nacogdoches, TX	none
1981	Panama City, FL	*Antlerless Deer Harvest Strategies*
1982	Charleston, SC	none
1983	Athens, GA	*Deer Damage Control*
1984	Little Rock, AR	*Dog-Deer Relationships in the Southeast*
1985	Wilmington, NC	*Socio-Economic Considerations in Managing White-tailed Deer*
1986	Gatlinburg, TN	*Harvest Strategies in Managing White-tailed Deer*
1987	Gulf Shores, AL	*Management: Past, Present, and Future*
1988	Paducah, KY	*Now That We Got Em, What Are We Going To Do With Em?*
1989	Oklahoma City, OK	*Management of Deer on Private Lands*
1990	Pipestem, WV	*Addressing the Impact of Increasing Deer Populations*
1991	Baton Rouge, LA	*Antlerless Deer Harvest Strategies: How Well Are They Working?*
1992	Annapolis, MD	*Deer Versus People*
1993	Jackson, MS	*Deer Management: How We Affect Public Perception and Reception*
1994	Charlottesville, VA	*Deer Management in the Year 2004*
1995	San Antonio, TX	*The Art and Science of Deer Management: Putting the Pieces Together*
1996	Orlando, FL	*Deer Management Philosophies: Bridging the Gap Between the Public and Biologists*
1997	Charleston, SC	*Obstacles to Sound Deer Management*
1998	Jekyll Island, GA	*Factors Affecting the Future of Deer Hunting*

1999	Fayetteville, AR	*QDM- What, How, Why, and Where?*
2000	Wilmington, NC	*Managing Deer in Tomorrow's Forests: Reality vs. Illusion*
2001	St. Louis, MO	*From Lewis & Clark to the New Millennium- The Changing Face of Deer Management*
2002	Mobile, AL	*Modern Deer Management- Balancing Biology, Politics, and Tradition*
2003	Chattanooga, TN	*Into the Future of Deer Management: Where Are We Heading?*
2004	Lexington, KY	*Today's Deer Hunting Culture: Asset or Liability?*
2005	Shepherdstown, WV	*The Impact of Today's Choices on Tomorrow's Deer Hunters*
2006	Baton Rouge, LA	*Managing Habitats, Herds, Harvest, and Hunters in the 21st Century Landscape. Will 20th Century Tools Work?*
2007	Ocean City, MD	*Deer and Their Influence on Ecosystems*
2008	Tunica, MS	*Recruitment of Deer Biologists and Hunters: Are Hook and Bullet Professionals Vanishing?*
2009	Roanoke, VA	*Herds Without Hunters: The Future of Deer Management?*
2010	San Antonio, TX	*QDM to IDM: The Next Step or the Last Straw?*
2011	Oklahoma City, OK	*All Dressed Up With No Place to Go: The Issue of Access*
2012	Sandestin, FL	*Shifting Paradigms: Are Predators Changing the Dynamics of Managing Deer in the Southeast?*
2013	Greenville, SC	*Challenges in Deer Research and Management in 2013*
2014	Athens, GA	*The Politics of Deer Management – Balancing Public Interest and Science*
2015	Little Rock, AR	*Integrating the North American Model of Wildlife Conservation into Deer Management*
2016	Charlotte/Concord, NC	*The Challenges of Meeting Hunter Expectations*
2017	St. Louis, MO	*Disease: Science, Politics, Management*

Members of the Deer Committee
The Wildlife Society, Southeast Section

STATE	NAME	AFFILIATION
ALABAMA	**Chris Cook, Deer Studies Project Leader;** Chris.Cook@dcnr.alabama.gov	Alabama Division of Wildlife & Freshwater Fisheries
ARKANSAS	**Cory Gray, Research, Evaluation & Compliance Division Manager**; cory.gray@agfc.ar.gov **Ralph Meeker, Deer Program Coordinator**; ralph.meeker@agfc.ar.gov	Arkansas Game and Fish Commission
DELAWARE	**Joe Rogerson, Species Conservation & Research Program Manager**; Joseph.Rogerson@state.de.us **Emily Boyd, Deer and Furbearer Biologist**; Emily.Boyd@state.de.us	Delaware Division of Fish and Wildlife
FLORIDA	**Cory R. Morea, Deer Management Program Coordinator**; Cory.Morea@MyFWC.com **Jim Stickles, Assistant Deer Program Coordinator**; Jim.stickles@myfwc.com **Steve Shea**; steve.shea@myfwc.com	Florida Fish & Wildlife Conservation Commission
GEORGIA	**Charlie Killmaster, Deer Project Coordinator**; charlie.killmaster@dnr.ga.gov **Tina Johannsen, Program Operations Manager, Game Management**; tina.johannsen@dnr.ga.gov	Georgia Department of Natural Resources, Wildlife Resources Division
	Karl V. Miller, Warnell School of Forestry and Natural Resources; kmiller@warnell.uga.edu	University of Georgia
KENTUCKY	**Gabe Jenkins, Deer and Elk Program Coordinator**; Gabriel.jenkins@ky.gov	Kentucky Department of Fish and Wildlife Resources
LOUISIANA	**Johnathan Bordelon, Deer Program Manager**; jbordelon@wlf.la.gov **Jimmy Ernst, DMAP Coordinator**; jernst@wlf.la.gov	Louisiana Department of Wildlife and Fisheries
MARYLAND	**Brian Eyler, Deer Project Leader**; brian.eyler@maryland.gov **George Timko, Assistant Deer Project Leader**; george.timko@maryland.gov	Maryland Department of Natural Resources
MISSISSIPPI	**William Mckinley, Deer Enclosure Program Coordinator**; williamm@mdwfp.state.ms.us	Mississippi Wildlife, Fisheries & Parks
	Steve Demarais (Comm. Chair) **Department of Wildlife, Fisheries & Aquaculture**; sdemarais@cfr.msstate.edu	Mississippi State University

MISSOURI	**Barb Keller, Cervid Program Supervisor**; Barbara.Keller@mdc.mo.gov **Kevyn Wiskirchen, Private Lands Deer Biologist**; Kevyn.Wiskirchen@mdc.mo.gov	Missouri Department of Conservation
NORTH CAROLINA	**David Sawyer, Surveys & Res Program Coordinator, Division of Wildlife Management**; david.sawyer@ncwildlife.org **Jonathan Shaw, Deer Biologist**; Jonathan.Shaw@ncwildlife.org	North Carolina Wildlife Resources Commission
OKLAHOMA	**Erik Bartholomew, Big Game Biologist**; erik.bartholomew@odwc.ok.gov **Jerry Shaw, Programs Supervisor**; Jerry.shaw@odwc.ok.gov	Oklahoma Department of Wildlife Conservation
SOUTH CAROLINA	**Charles Ruth, Deer/Turkey Program Coordinator**; ruthc@dnr.sc.gov	South Carolina Department Natural Resources
TENNESSEE	**James D. Kelly, Deer Management Program Leader, Wild Hog Eradication Program Leader**; James.Kelly@tn.gov **Ben Layton, Big Game Biologist**; ben.layton@tn.gov	Tennessee Wildlife Resources Agency
	Craig Harper, Professor/Extension Wildlife Specialist, Department of Forestry, Wildlife, and Fisheries; charper@utk.edu	University of Tennessee
TEXAS	**Alan Cain, WT Deer Program Leader;** alan.cain@tpwd.texas.gov	Texas Parks & Wildlife Department
	Bob Zaiglin, Coordinator, Wildlife Management Department; zaiglin@sbcglobal.net	Southwest Texas Junior College
VIRGINIA	**W. Matt Knox, Deer Project Coordinator**; matt.knox@dgif.virginia.gov **Nelson Lafon, Deer Project Coordinator;** nelson.lafon@dgif.virginia.gov	Virginia Department of Game and Inland Fisheries
WEST VIRGINIA	**Jim Crum** James.M.Crum@wv.gov	West Virginia Division of Natural Resources
QDMA	**Kip Adams** kadams@QDMA.com	Quality Deer Management Association

Southeast Deer Study Group Awards

Career Achievement Award

1996 – Richard F. Harlow
1997 – Larry Marchinton
1998 – Harry Jacobson
1999 – David C. Guynn, Jr.
2000 – Joe Hamilton
2002 – Robert L. Downing
2004 – Charles DeYoung
2005 – Kent E. Kammermeyer
2006 – William E. "Bill" Armstrong
2007 – Jack Gwynn
2008 – (none)
2009 – David E. Samuel
2010 – Bob K. Carroll
2011 – Quality Deer Management Association
2012 – Robert E. Zaiglin
2013 – (none)
2014 – Mark O. Bara
2015 – Larry E. Castle
2016 – J. Scott Osborne

Outstanding Student Oral Presentation Award

1996 – Billy C. Lambert, Jr. (Texas Tech University)
1997 – Jennifer A. Schwartz (University of Georgia)
1998 – Karen Dasher (University of Georgia)
1999 – Roel R. Lopez (Texas A&M University)
2000 – Karen Dasher (University of Georgia)
2001 – Roel R. Lopez (Texas A&M University)
2002 – Randy DeYoung (Mississippi State University)
2003 – Bronson Strickland (Mississippi State University)
2004 – Randy DeYoung (Mississippi State University)
2005 – Eric Long (Penn State University)
2006 – Gino D'Angelo (University of Georgia)
2007 – Sharon A. Valitzski (University of Georgia)
2008 – Cory L. Van Gilder (University of Georgia)
2009 – Michelle Rosen (University of Tennessee)
2010 – Jeremy Flinn (Mississippi State University)
2011 – Kamen Campbell (Mississippi State University)
2012 – Brad Cohen (University of Georgia)
2013 – Michael Cherry (University of Georgia)
2014 – Bradley Cohen (University of Georgia)
2015 – Eric Michel (Mississippi State University)
2016 – Rebecca Shuman (University of Georgia)

Outstanding Student Poster Presentation Award

2010 – Emily Flinn (Mississippi State University)
2011 – Melissa Miller (University of Delaware)
2012 – Brandi Crider (Texas A&M University)
2013 – Jacob Haus (University of Delaware)
2014 – Blaise Korzekwa (Texas A&M University–Kingsville)
2015 – Lindsay D. Roberts (Texas A&M University–Kingsville)
2016 – Lindsey Phillips (Texas A&M – Kingsville)

CONFERENCE SCHEDULE AT-AT-GLANCE

Monday 2/27/2017

9:00 a.m. – 7:00 p.m.	**Conference Registration Desk Open**	*Banquet Lobby*
9:00 a.m. – 7:00 p.m.	**Exhibitor Set-up**	*Frontenac*
12:00 p.m. – 7:00 p.m.	**Poster Set-up**	*Ambassadeur Ballroom*
3:00 p.m. – 5:00 p.m.	**SEDSG Technical Committee Meeting**	*Le Café*
6:00 p.m. – 9:00 p.m.	☆ **Welcome Social!**	*Frontenac*

Tuesday 2/28/2017

7:00 a.m. – 5:00 p.m.	**Conference Registration Desk Open**	*Banquet Lobby*
7:00 a.m. – 5:00 p.m.	**Exhibitor Displays**	*Frontenac*
7:00 a.m. – 5:00 p.m.	**Poster Displays**	*Ambassadeur Ballroom*
8:00 a.m. – 9:50 a.m.	**Technical Session I**	*Ambassadeur Ballroom*
9:50 a.m. – 10:10 a.m.	**Refreshment Break**	*Frontenac*
10:10 a.m. – 12:10 p.m.	**Technical Session II**	*Ambassadeur Ballroom*
12:10 p.m. – 1:30 p.m.	**Lunch on your own**	
1:30 p.m. – 3:20 p.m.	**Technical Session III**	*Ambassadeur Ballroom*
3:20 p.m. – 3:40 p.m.	**Refreshment Break**	*Frontenac*
3:40 p.m. – 5:00 p.m.	**Technical Session IV**	*Ambassadeur Ballroom*
	Dinner on your own	
7:00 p.m. – 9:00 p.m.	☆ **"Shoot from the Hip" Social**	*Ambassadeur Ballroom*

Wednesday 3/1/2017

7:00 a.m. – 5:00 p.m.	**Conference Registration Desk Open**	*Banquet Lobby*
7:00 a.m. – 5:00 p.m.	**Exhibitor Displays**	*Frontenac*
7:00 a.m. – 5:00 p.m.	**Poster Displays**	*Ambassadeur Ballroom*
8:00 a.m. – 9:50 a.m.	**Technical Session V**	*Ambassadeur Ballroom*
9:50 a.m. – 10:10 a.m.	**Refreshment Break**	*Frontenac*
10:10 a.m. – 12:10 p.m.	**Technical Session VI**	*Ambassadeur Ballroom*
12:10 p.m. – 1:30 p.m.	**Lunch on your own**	
1:30 p.m. – 3:20 p.m.	**Technical Session VII**	*Ambassadeur Ballroom*
3:20 p.m. – 3:40 p.m.	**Refreshment Break**	*Frontenac*
3:40 p.m. – 5:00 p.m.	**Technical Session VIII**	*Ambassadeur Ballroom*
5:00 p.m. – 6:30 p.m.	**SEDSG Technical Committee Business Meeting**	*Le Café*
6:00 p.m. – 7:00 p.m.	☆ **Pre-Banquet Networking Social**	*Atrium (Clayton Building, 2nd Floor)*
7:00 p.m. – 9:00 p.m.	☆ **Banquet & Awards**	*Clayton Ballroom (Clayton Building, 1st Floor)*

TECHNICAL SESSION SCHEDULE

TUESDAY ♦ FEBRUARY 28, 2017

*Student Presenter

TECHNICAL SESSION I

Moderator: Charles W. Anderson, Missouri Department of Conservation

8:00 AM **Introductions**
Charles W. Anderson – Resource Science Supervisor, Missouri Department of Conservation

8:10 AM **Welcome**
Tom A. Draper – Deputy Director, Missouri Department of Conservation

8:20 AM John F. Organ – Chief, U.S.G.S. Cooperative Fish and Wildlife Research Units

8:50 AM Jason A. Sumners – Wildlife Division Chief, Missouri Department of Conservation

9:20 AM Kelly Straka – Wildlife Health Section Supervisor, Michigan Department of Natural Resources

9:50 AM **Break**

TECHNICAL SESSION II

Moderator: Kevyn H. Wiskirchen, Missouri Department of Conservation

10:10 AM **Five (or More) Decades of Chronic Wasting Disease: Lessons for the Next Five Decades**
Michael W. Miller, Colorado Parks and Wildlife; John R. Fischer, Southeastern Cooperative Wildlife Disease Study
Presenter: John Fischer

10:30 AM **National Deer Alliance and the Political Science of CWD**
Nick Pinizzotto, National Deer Alliance

10:50 AM **Once Bitten, Twice Shy: New York's Risk-based Approach to Chronic Wasting Disease**
Krysten Schuler, Cornell University

11:10 AM **Chronic Wasting Disease in Arkansas**
Cory Gray, Arkansas Game and Fish Commission; Ralph Meeker, Arkansas Game and Fish Commission

11:30 AM **You Can't Bring That Here! Working Together to Reduce the Risk of CWD Introduction**
Merril Cook, North Carolina Wildlife Resources Commission; Maria Palamar, North Carolina Wildlife Resources Commission

11:50 AM **A Model-based Framework for Improving Chronic Wasting Disease Surveillance in White-tailed Deer Populations of Missouri**
Aniruddha Belsare, University of Missouri; Jason Sumners, Missouri Department of Conservation; Emily Flinn; Barbara Keller, Missouri Department of Conservation; Matthew Gompper, University of Missouri; Joshua Millspaugh, University of Montana

12:10 PM **Lunch on your own**

TUESDAY ♦ FEBRUARY 28, 2017

TECHNICAL SESSION III

Moderator: Ryan E. Leeson, Southern Illinois University-Carbondale

1:30 PM **Announcements**

1:40 PM *__Browsing Optimization Hypothesis: Influence of Deer Density__
Justin P. Young, Timothy E. Fulbright, David G. Hewitt, Charles A. DeYoung – Caesar Kleberg Wildlife Research Institute, Texas A&M University-Kingsville; Don A. Draeger, Comanche Ranch

2:00 PM **Managing Deer at the Intersection of Ecosystem Restoration, Game Management, and Endangered Species Conservation**
Elina P. Garrison, Florida Fish and Wildlife Conservation Commission; Stephen M. Shea, Florida Fish and Wildlife Conservation Commission; Cory R. Morea, Florida Fish and Wildlife Conservation Commission; Michael J. Cherry, Virginia Tech; David B. Shindle, U.S. Fish and Wildlife Service; Richard B. Chandler, University of Georgia; L. Mike Conner, Joseph W. Jones Ecological Research Center; Karl V. Miller, University of Georgia

2:20 PM **Supplemental Feeding and Baiting Regulations: Do They Make Sense?**
Tim Neuman, Ani-Logics Outdoors; Brian Dorcey, Veterinary Medical Center

2:40 PM **State of the Whitetail: Trends in Harvest and Management Programs**
Kip Adams, Quality Deer Management Association; Matt Ross, Quality Deer Management Association; Brian Murphy, Quality Deer Management Association

3:00 PM **Influence of Soil Nutrients on Plant Nutrition for White-tailed Deer**
Craig A. Harper, University of Tennessee; Marcus A. Lashley, Mississippi State University; Jordan S. Nanney, University of Tennessee; Bronson K. Strickland, Mississippi State University

3:20 PM **Break**

TECHNICAL SESSION IV

Moderator: Jonathan K. Trudeau, Ball State University

3:40 PM ***20 Years of the Modern Vaginal Implant Transmitter: Then and Now**
Justin R. Dion, University of Delaware; Jacob L. Bowman, University of Delaware; Jacob M. Haus, University of Delaware; Joseph E. Rogerson, Delaware Department of Natural Resources and Environmental Control

4:00 PM ***Retention of Expandable Collars on Male White-tailed Deer**
Jacob M. Haus, University of Delaware; Jacob L. Bowman, University of Delaware; Joseph E. Rogerson, Delaware Department of Natural Resources and Environmental Control

4:20 PM *__Estimating White-tailed Deer Fawn Survival and Recruitment with Spatial Capture-recapture Models and Camera Data__
Kristin N. Engebretsen, University of Georgia; Michael J. Cherry, Virginia Tech; Elina Garrison, Florida Fish and Wildlife Conservation Commission; Karl V. Miller, University of Georgia; Richard B. Chandler, University of Georgia

4:40 PM ***Do Preseason Camera Surveys Reflect Harvest Availability During the Hunting Season?**
James T. Johnson, University of Georgia; Michael J. Cherry, Virginia Tech; L. Mike Conner, Joseph W. Jones Ecological Research Center; Richard B. Chandler, University of Georgia; Brandon T. Rutledge, Joseph W. Jones Ecological Research Center; Charlie H. Killmaster, Georgia Department of Natural Resources; Michael T. Biggerstaff, University of Georgia; Karl V. Miller, University of Georgia

WEDNESDAY ♦ MARCH 1, 2017

TECHNICAL SESSION V

Moderator: Emily H. Belser, Texas A&M University-Kingsville

8:00 AM **Announcements**

8:10 AM **New World Screwworm Infestation of Key Deer**
Rebecca Shuman, Florida Fish and Wildlife Conservation Commission; Samantha Gibbs, U.S. Fish and Wildlife Service; Mark Cunningham, Florida Fish and Wildlife Conservation Commission; Lara Cusak, Florida Fish and Wildlife Conservation Commission; Cory Morea, Florida Fish and Wildlife Conservation Commission

8:30 AM ***New World Screwworm Impacts on the Endangered Florida Key Deer**
Jared Beaver, Israel Parker, Brian Pierce – Texas A&M University; Kate Watts, U.S. Fish & Wildlife Service; Nova Silvy, Texas A&M University; Roel Lopez, Texas A&M University

8:50 AM **Is Drought a Risk Factor for Hemorrhagic Disease in the Eastern United States?**
David Stallknecht, Southeastern Cooperative Wildlife Disease Study; Mark Ruder, Southeastern Cooperative Wildlife Disease Study; John Fischer, Southeastern Cooperative Wildlife Disease Study; Sonja Christensen, Michigan State University

9:10 AM **Epizootic Hemorrhagic Disease Virus Serotype 6 in the United States: The First 10 Years (2006-2015)**
Mark G. Ruder, Southeastern Cooperative Wildlife Disease Study; Donna Johnson, National Veterinary Services Laboratories; Eileen Ostlund, National Veterinary Services Laboratories; Andrew B. Allison, Virginia Tech; Clara Kienzle, Southeastern Cooperative Wildlife Disease Study; Jamie E. Phillips, Aalto Scientific; Rebecca L. Poulson, Southeastern Cooperative Wildlife Disease Study; David E. Stallknecht, Southeastern Cooperative Wildlife Disease Study

9:30 AM ***Genetic Contribution of Northern Lineages to Free-range Populations of White-tailed Deer in Southcentral U.S**
Jordan L. Youngmann, Mississippi State University; Steve Demarais, Mississippi State University; Randy W. DeYoung, Texas A&M University-Kingsville; Bronson Strickland, Mississippi State University

9:50 AM **Break**

WEDNESDAY ♦ MARCH 1, 2017

TECHNICAL SESSION VI

Moderator: Alicia M. Lombardo, Missouri Department of Conservation

10:10 AM ***Factors Influencing Nutritional Condition of White-tailed Deer in the Appalachian Mountains of Virginia**
Andrew B. Kniowski, Virginia Tech; Michael J. Cherry, Virginia Tech; Nelson W. Lafon, Virginia Department of Game and Inland Fisheries; David E. Steffen, Virginia Department of Game and Inland Fisheries; W. Matt Knox, Virginia Department of Game and Inland Fisheries; W. Mark Ford, U.S. Geological Survey

10:30 AM **A Comparison of Results from USDA and Farm Bureau Survey Efforts Regarding Deer in Missouri**
Ronald Reitz, Missouri Department of Conservation

10:50 AM ***Modeling Nutritional Carrying Capacity and Summer Forage Distribution for Deer in the Cumberland Mountains, Tennessee**
Jordan Nanney, University of Tennessee; Craig Harper, University of Tennessee; David Buehler, University of Tennessee; Gary Bates, University of Tennessee

11:10 AM **Consistency and Reliability of Deer Ages from Central Florida**
Donal A. Woodard, Deseret Ranches; Justin Field, Deseret Ranches

11:30 AM ***Evaluation of Culling Intensity and Criteria for Antler Traits in White-tailed Deer**
Masahiro Ohnishi, Texas A&M University-Kingsville; Randy W. DeYoung, Texas A&M University-Kingsville; Charles A. DeYoung, Texas A&M University-Kingsville; Bronson Strickland, Mississippi State University; Steven Lukefahr, Texas A&M University-Kingsville; Don A. Draeger, Comanche Ranch; David G. Hewitt, Texas A&M University-Kingsville

11:50 PM ***Effects of Resource Density, Deer Age, and Sex on a Concentrated Resource by White-tailed Deer**
Emily H. Belser, David G. Hewitt, Timothy E. Fulbright, Charles A. DeYoung, David B. Wester – Texas A&M University-Kingsville; Thomas W. Boutton, Texas A&M University; Don A. Draeger, Comanche Ranch

12:10 PM **Lunch on your own**

TECHNICAL SESSION VII

Moderator: Jordan L. Youngmann, Mississippi State University

1:30 PM **Announcements**

1:40 PM ***Comparison of Adult Urban and Rural White-tailed Deer Space Use in Southern Indiana**
Jonathan K. Trudeau, Ball State University; Garrett B. Clevinger, Ball State University; Timothy C. Carter, Ball State University

2:00 PM ***A Comparison of White-tailed Deer Recruitment Rates to Relative Predator Abundance in Maryland**
Eric Ness, University of Delaware; Jacob L. Bowman, University of Delaware; Brian Eyler, Maryland Department of Natural Resources

2:20 PM ***Survival and Cause-specific Mortality of Adult White-tailed Deer on Public and Private Lands**
Kevyn H. Wiskirchen, Auburn University; Todd C. Jacobsen, Auburn University; Stephen S. Ditchkoff, Auburn University; Steve Demarais, Mississippi State University; James B. Grand, U.S. Geological Survey

2:40 PM ***Factors Affecting Survival of Neonatal White-tailed Deer in Missouri**
Chloe A. Wright, University of Montana; Jon T. McRoberts, University of Missouri; Joshua J. Millspaugh, University of Montana; Barbara J. Keller, Missouri Department of Conservation

3:00 PM ***Dead Downwind: Quantifying Caution in White-tailed Deer**
Daniel Crawford, University of Georgia; Michael J. Cherry, Virginia Tech; Brian Kelly, University of Georgia; Richard B. Chandler, University of Georgia; Elina Garrison, Florida Fish and Wildlife Conservation Commission; L. Mike Conner, Joseph Jones Ecological Research Center; Karl V. Miller, University of Georgia

3:20 PM **Break**

TECHNICAL SESSION VIII

Moderator: Jacob M. Haus, University of Delaware

3:40 PM **Community Deer Management in Town & Country, Missouri: Sharpshooting and Sterilization to Reduce Deer Density**
Erin Shank, Missouri Department of Conservation

4:00 PM **A Changing Landscape in the Northern Georgia Mountains: Bear, Deer, and Forests**
Andrew R. Little, University of Georgia; Gino J. D'Angelo, University of Georgia; Charlie H. Killmaster, Georgia Department of Natural Resources; Kristina L. Johannsen, Georgia Department of Natural Resources; Karl V. Miller, University of Georgia

4:20 PM **From Ridiculed to Recognized: 22 Years of Deer Research and Management on Hilton Head, SC**
David Henderson, Community Services Associates; Robert Warren, University of Georgia; Charles Ruth, South Carolina Department of Natural Resources

4:40 PM **Organized Archery Hunting to Manage White-tailed Deer Populations in Fairfax County, Virginia**
Kevin R. Rose, Virginia Department of Game and Inland Fisheries; Katherine Edwards, Fairfax County Police Department

POSTER SESSION

TUESDAY & WEDNESDAY ♦ 7:00 AM – 5:00 PM

Posters are listed in alphabetical order by last name of the primary author, and each has been assigned a poster number. Poster authors will be available to discuss their posters during the scheduled breaks.
*Student Presenter

P-01 *To Bait or Not to Bait: Comparing Camera Survey Methods for White-tailed Deer Population Estimation
Robert Baldwin, Wake Forest University; Jared Beaver; Michael Anderson; Matt Windsor; Miles Silman

P-02 *Using Passive Cameras to Monitor Deer Activity Patterns During the Breeding Season
Michael T. Biggerstaff, University of Georgia; Michael J. Cherry, Virginia Tech University; L. Mike Conner, Joseph W. Jones Ecological Research Center; Richard B. Chandler, University of Georgia; Charlie Killmaster, Georgia Department of Natural Resources; James T. Johnson, University of Georgia; Karl V. Miller, University of Georgia

P-03 *Varying Perceptions of Coyotes Within the Hunting Community
C. Moriah Boggess, North Carolina State University; Mark A. Turner, North Carolina State University; Michael D. Drake, North Carolina State University; Mallory Gyovai, North Carolina State University; M. Nils Petersen, North Carolina State University; Chris Serenari, North Carolina Wildlife Resources Commission; Colleen Olfenbuttel, North Carolina Wildlife Resources Commission; Michael Chamberlain, University of Georgia; Karl V. Miller, University of Georgia

P-04 *Can Vegetation Characteristics Indicate Habitat Quality for White-tailed Deer (*Odocoileus virginianus*)?
Donald P. Chance, Mississippi State University; Johannah R. McCollum, Mississippi State University; Marcus A. Lashley, Mississippi State University; Garrett M. Street, Mississippi State University; Bronson Strickland, Mississippi State University

P-05 * Comparison of Seasonal Movements Between Localized Populations of Urban and Rural White-tailed Deer in Southern Indiana
Garrett B. Clevinger, Ball State University; Jonathan K. Trudeau, Ball State University; Timothy C. Carter, Ball State University

P-06 *Understanding Mechanisms of Diet Selection in White-tailed Deer
Jacob Dykes, Mississippi State University; Marcus Lashley, Mississippi State University; Bronson Strickland, Mississippi State University; Steve Demarais, Mississippi State University; Dan Reynolds, Mississippi State University

P-07 Evaluation of Insecticides and Repellents for Suppression of Feeding Injury by Deer in Soybeans
W. Cory Heaton, Clemson University; Jeremy K. Greene, Clemson University; David Gunter, Clemson University; Jonathan Croft, Clemson Cooperative Extension Service

P-08 *Proactive Anti-predator Behavior of White-tailed Deer (*Odocoileus virginianus*) During Fawning Season
Summer D. Higdon, University of Missouri-Columbia; Corinne A. Diggins, Virginia Tech; Michael J. Cherry, Virginia Tech; W. Mark Ford, Virginia Cooperative Fish and Wildlife Unit

P-09 *Does Social Class of White-tailed Deer Influence Use of Supplemental Feeders?
Onalise R. Hill, Texas A&M University–Kingsville; Justin P. Young, Texas A&M University–Kingsville; Timothy E. Fulbright, Texas A&M University–Kingsville; David G. Hewitt, Texas A&M University–Kingsville; Charles A. DeYoung, Texas A&M University–Kingsville; Don A. Draeger, Comanche Ranch

P-10 *Influence of White-tailed Deer on Oak and Hickory Regeneration in Southern Illinois
Ryan E. Leeson, Southern Illinois University Carbondale; Clayton K. Nielsen, Southern Illinois University Carbondale; Devon C. Oliver, Southern Illinois University Carbondale; Eric J. Holzmueller, Southern Illinois University Carbondale

POSTER SESSION continued

P-11 *Comparison of Food Plot Mixtures for Attracting White-tailed Deer
Ryan E. Leeson, Southern Illinois University Carbondale; Clayton K. Nielsen, Southern Illinois University Carbondale; Devon C. Oliver, Southern Illinois University Carbondale; William J. Banz, Southern Illinois University Carbondale

P-12 *Female Mate Choice in White-tailed Deer: Does Male Phenotypic Quality Inform Preference?
Daniel L. Morina, Mississippi State University; Steve Demarais, Mississippi State University; Bronson K. Strickland, Mississippi State University; Jamie E. Larson, Mississippi State University

P-13 *Does White-tailed Deer Browsing Result in Browse Lines on Three Preferred South Texas Woody Plants?
Lindsey M. Phillips, Texas A&M University–Kingsville; Timothy E. Fulbright, Texas A&M University–Kingsville; David G. Hewitt, Texas A&M University–Kingsville; Charles A. DeYoung, Texas A&M University–Kingsville; Don A. Draeger, Comanche Ranch

P-14 The Culicoides Enigma: Which Biting Midge Species Are Important in HD Epidemiology in the Southeast?
Mark G. Ruder, Southeastern Cooperative Wildlife Disease Study; Stacey L. Vigil, Southeastern Cooperative Wildlife Disease Study; David E. Stallknecht, Southeastern Cooperative Wildlife Disease Study; David Shaw, Southeastern Cooperative Wildlife Disease Study; Matthew D. Walter, Southeastern Cooperative Wildlife Disease Study; Clara Kienzle, Southeastern Cooperative Wildlife Disease Study; Kayla Garrett, Southeastern Cooperative Wildlife Disease Study; Joseph L. Corn, Southeastern Cooperative Wildlife Disease Study

P-15 *Quantifying the Effects of Coyotes on Vigilance Behavior in White-tailed Deer
D.S. Steakley, Mississippi State Univerisity; M.A. Lashley, Mississippi State University; M.C. Chitwood, University of Montana; C.S. DePerno, North Carolina State University; C.E. Moorman, North Carolina State University

P-16 *Spatio-temporal Responses of White-tailed Deer to the Use of Bait During the Hunting Season
David B. Stone, University of Georgia; Tom Prebyl, University of Georgia; James A. Martin, University of Georgia; Charlie Killmaster, Georgia Department of Natural Resources; Karl V. Miller, University of Georgia

P-17 *Breeding Chronology and Social Interactions Affect White-tailed Deer Vigilance at Bait Sites
David B. Stone, University of Georgia; Michael J. Cherry, Virginia Tech; Bradley S. Cohen, University of Georgia; James A. Martin, University of Georgia, Charlie Killmaster, Georgia Department of Natural Resources; Karl V. Miller, University of Georgia

P-18 *Temporal Resolution of the White-tailed Deer Visual System and Implications for Movement Detection
Eryn M. Watson, University of Georgia; Bradley S. Cohen, University of Georgia; David A. Osborn, University of Georgia; Michele Barletta, University of Georgia; Kate Myrna, University of Georgia; Krista Mitchell, University of Georgia; Karl V. Miller, University of Georgia

ABSTRACTS

TUESDAY. 2/28/2017. TECHNICAL SESSION II

Tuesday, 10:10 AM

Five (or More) Decades of Chronic Wasting Disease: Lessons for the Next Five Decades

Authors
Michael W. Miller, Colorado Parks and Wildlife; John R. Fischer, Southeastern Cooperative Wildlife Disease Study
Presenter: John Fischer

Abstract
Chronic wasting disease (CWD) has run the gamut from minor scientific curiosity to national crisis since it first was recognized in the late 1960s. As of November 2016, CWD had been reported in captive and/or wild cervids in 24 states, three provinces, South Korea, and Norway. With few exceptions, once in the wild CWD has persisted in the face of varied control attempts. Several factors have contributed to CWD's spread and persistence: Natural factors include prolonged incubation, multiple routes of agent shedding, the agent's environmental persistence, and natural movements of wild cervids. Anthropogenic factors include movement of infected live animals (and perhaps infectious tissues and other materials), concentrating susceptible species, and other artificial management practices. Many facets of CWD biology and ecology now are understood, but science informing effective management and control strategies remains incomplete. Eradicating CWD appears infeasible given its distribution and other epidemiological attributes. Regardless, adaptive approaches for containing foci and reducing prevalence have shown some promise and deserve further attention. Such pursuits undoubtedly will be more difficult to garner support for in sociopolitical climates ranging from apathetic to combative; however, we believe there are two important motivations for making progress toward sustainable containment and control strategies for CWD in the coming decades: Data from several sources suggest that heavily-infected cervid populations will not thrive in the long-term. Second, data on CWD prions and experience with other animal prion diseases suggest minimizing human exposure to these agents is prudent.

Key Words: chronic wasting disease

Contact: jfischer@uga.edu

NOTES:

Tuesday, 10:30 AM

National Deer Alliance and the Political Science of CWD

Authors
Nick Pinizzotto, National Deer Alliance

Abstract
The mission of the National Deer Alliance (NDA) is to serve as the guardian of wild deer conservation and our hunting heritage. Despite 83% of the nearly 14 million hunters in the United States identifying themselves as deer hunters, there was no national organization geared toward protecting the interests of all deer, hunters and the deer hunting industry before the formation of NDA. NDA serves as a policy-focused umbrella group to its founding organizations, QDMA, Mule Deer Foundation, and Whitetails Unlimited.

NDA's key priorities include wild deer conservation, diseases, hunter access, predators and competitors, and state and federal land management. Deer diseases are the current top priority of the organization, particularly chronic wasting disease (CWD). NDA recently formed a special working group made up of national conservation groups and other thought leaders to submit comments to USDA for their CWD Program Standards for management of captive cervids. In addition, the organization is working on a critical strategy for ensuring that the threat of CWD is better understood on Capitol Hill, as well as in the state legislators.

While the threat of CWD to wild deer is real, we face a number of challenges when it comes to creating a sense of urgency among sportsmen, legislators, and other decision makers. In addition, some individuals prominent in the deer community are actively downplaying the threat. In this presentation, the political science of managing CWD will be discussed, and a brief background on the history of NDA and its goals will be provided.

Key Words: CWD, politics

Contact: nick@nationaldeeralliance.com

NOTES:

Tuesday, 10:50 AM

Once Bitten, Twice Shy: New York's Risk-based Approach to Chronic Wasting Disease

Authors
Krysten Schuler, Cornell University

Abstract
In 2005, New York discovered chronic wasting disease in both captive and wild white-tailed deer. There have been no subsequent detections in over 35,000 deer tested. In 2011, the New York State Dept. of Environmental Conservation partnered with Cornell University to form a comprehensive wildlife health program. A program priority was to update CWD management to incorporate elements of risk into decision making. We conducted onsite surveys at deer processors, taxidermists, and captive cervid operations to identify potential disease introduction or transmission activities. Using aggregated risk scores and estimated deer density, we developed point quotas for each county. Sex and age class point values were established to meet quotas, which included training taxidermists to collect retropharyngeal lymph nodes from adult bucks. For our response plan, we convened an interagency team of biologists and veterinarians to identify responsibilities and actions. We created a CWD Outbreak Response GIS Toolbox to delineate our initial response area based on a cumulative disease risk probability map, established by a field study of deer movement, deer interaction, and resource use. Finally, we used our interagency team and a risk perception study of state agencies and stakeholders to identify high risk activities for a CWD prevention plan. Currently, there is no live import of captive cervids into the state and plans are underway for additional regulations, including prohibiting import of whole carcasses into New York and use of deer urine products while afield. Keys to success have been interagency cooperation, immediate action, and disease prevention measures.

Key Words: chronic wasting disease, prevention, risk assessment

Contact: ks833@cornell.edu

NOTES:

Tuesday, 11:10 AM

Chronic Wasting Disease in Arkansas

Authors

Cory Gray, Arkansas Game and Fish Commission; Ralph Meeker, Arkansas Game and Fish Commission

Abstract

Chronic wasting disease (CWD), a neurodegenerative disease of cervids, was detected in Arkansas for the first time in February 2016 in a 2.5-year female elk legally harvested in October 2015 near Pruitt in Newton County. During that same period, a CWD-positive 2.5-year female white-tailed deer was found dead in Ponca in Newton County. At the time of this abstract submission, a total of 158 cervids have been confirmed positive for CWD in Arkansas; 6 elk and 152 white-tailed deer.

During 14-24 March 2016, biologists from the Arkansas Game and Fish Commission (AGFC) and other agencies randomly collected 266 white-tailed deer from a 125,000-acre CWD Focal Area in Newton County, Arkansas. CWD was detected in 62 (23%) of these animals. CWD prevalence rate in female and male deer was 20% and 32%, respectively.

To explore spatial distribution, additional sampling of road-killed (i.e., deer struck and killed by vehicles) and target animals (i.e., cervids exhibiting any illness or unusual activity) was implemented, statewide, in March 2016. This detection strategy proved effective in identifying the disease in four additional counties in north Arkansas.

The AGFC implemented a series of regulations during the summer of 2016 with two goals in mind: 1) Minimize disease introduction into new areas, and 2) minimize disease amplification in already established areas. These regulations went into effect for the 2016 hunting season.

Hunter surveillance efforts for the 2016 modern gun deer season have identified additional positives in a total of 7 counties.

Key Words: Arkansas, CWD, surveillance

Contact: cory.gray@agfc.ar.gov

NOTES:

Tuesday, 11:30 AM

You Can't Bring That Here! Working Together to Reduce the Risk of CWD Introduction

Authors

Merril Cook, North Carolina Wildlife Resources Commission; Maria Palamar, North Carolina Wildlife Resources Commission

Abstract

As Chronic Wasting Disease (CWD) continues to claim new U.S. states at a staggering rate, state agencies must craft and enforce regulations that will minimize the risk of disease introduction. Tight regulations have been imposed in many U.S. states to prohibit the importation of high risk cervid parts, identifying both out-of-state hunters and taxidermists as high risk points of entry. After the North Carolina Wildlife Resources Commission (NCWRC) conducted two surveys (one to 77 state agency employees involved with free-range or captive cervids, and the second to 748 N.C. taxidermists), we discovered that only four states of the 41 states represented in our results required reporting of imported cervid carcasses. Also, though 36 agency employees stated their state had importation regulations, only 7 indicated their agency also distributed other states regulations. According to 326 N.C. taxidermists who accept cervid carcasses and carcass parts, 45% felt their clients had very little knowledge of our state's carcass importation regulations, and 73% requested educational material from the NCWRC. In response, we've begun implementing methods of outreach such as collaborating with state agencies and N.C. taxidermists to distribute information about regulations and CWD to hunters and processors. We're also looking into ways to record incoming carcasses from out-of-state and obtaining more opportunities for collecting CWD samples. With this, it is our goal to build a model where collaborating parties take interest in working together to reduce the risk of CWD spreading nation-wide.

Key Words: chronic wasting disease, cervid carcass transportation, cervid carcass importation Regulations

Contact: merril.cook@ncwildlife.org

NOTES:

Tuesday, 11:50 AM

A Model-based Framework for Improving Chronic Wasting Disease Surveillance in White-tailed Deer Populations of Missouri

Authors

Aniruddha Belsare, University of Missouri; Jason Sumners, Missouri Department of Conservation; Emily Flinn; Barbara Keller, Missouri Department of Conservation; Matthew Gompper, University of Missouri; Joshua Millspaugh, University of Montana

Abstract

The rising number of chronic wasting disease (CWD) infected deer detected in hunter-harvest as well as the recent discoveries of new foci of CWD in Missouri are both indicative of a continual need for CWD surveillance and monitoring. It is therefore necessary to review the current sampling approach to ensure a reliable, efficient and sustainable sampling effort. We use an agent-based modeling approach to evaluate current surveillance strategies in the context of heterogeneities arising due to sampling biases and CWD distribution in the landscape. This framework can be used to determine optimum sample sizes for meaningful surveillance and monitoring of CWD. We explore the relationship between observed (sample) prevalence and true prevalence under various assumptions and sampling regimes. Most importantly, this approach provides a framework to derive meaningful inferences from CWD surveillance data.

Key Words: chronic wasting disease, agent-based modeling, sampling strategy

Contact: belsarea@missouri.edu

NOTES:

TUESDAY. 2/28/2017. TECHNICAL SESSION III

Tuesday, 1:40 PM

***Browsing Optimization Hypothesis: Influence of Deer Density**

Authors
Justin P. Young, Timothy E. Fulbright, David G. Hewitt, Charles A. DeYoung – Caesar Kleberg Wildlife Research Institute, Texas A&M University–Kingsville; Don A. Draeger, Comanche Ranch

Abstract
Wildlife managers traditionally expect abundance and quality of forage to decline as deer density increases. However, few controlled studies on this topic have been conducted on a wide range of white-tailed deer densities. An alternative idea is that growth and quality of browse may increase to some optimum deer density and then decline as density increases. In addition, plant defenses such as thorns and tannins may also increase. Our objectives were to test this hypothesis by determining regrowth and nutritional quality of blackbrush acacia, twisted acacia, and spiny hackberry in response to increasing white-tailed deer densities. Starting July 2014, shoots and thorns were measured annually on marked stems for each shrub species in 200 acre enclosures containing 0, 20, 40, and 60 deer. Each enclosure contained a single supplemental feeder. Each July and October, leaf and stem samples were collected from a different set of plants of each shrub species for nutritional quality analysis of fiber, protein, and tannins. Measurements and samples were taken within the deer's browsing zone (20–40 inches from the ground). Preliminary results indicate all 3 browse species exhibited compensatory growth and increased branching to a threshold of 40 deer per 200 acres, without declines in nutritional quality or increases in thorn or tannin defenses. Traditionally, managers strive for deer densities low enough to avoid causing undesirable changes in the plant community. An alternative and more efficient approach may be to manage to optimize browse quantity and quality using deer as the tool.

Key Words: browse, deer density

Contact: j.pierce.young@gmail.com

NOTES:

Tuesday, 2:00 PM

Managing Deer at the Intersection of Ecosystem Restoration, Game Management, and Endangered Species Conservation

Authors

Elina P. Garrison, Florida Fish and Wildlife Conservation Commission; Stephen M. Shea, Florida Fish and Wildlife Conservation Commission; Cory R. Morea, Florida Fish and Wildlife Conservation Commission; Michael J. Cherry, Virginia Tech; David B. Shindle, U.S. Fish and Wildlife Service; Richard B. Chandler, University of Georgia; L. Mike Conner, Joseph W. Jones Ecological Research Center; Karl V. Miller, University of Georgia

Abstract

Management of white-tailed deer (*Odocoileus virginianus*) in southern Florida involves a complex association of biological, social, political, and economic forces. Deer are the most popular game species, and the primary prey of the endangered Florida panther (*Puma concolor*), a predator that generates strong, and diverse opinions. Managers must therefore assess deer management from both game and prey management perspectives, while balancing the societal complexities of restoration of an apex predator in the system. In recent decades, harvest and aerial monitoring data suggest that deer populations are declining in portions of southern Florida; however, the causes are unknown as declines have coincided with changing hydrological regimes, habitat conditions, and predator community. The Comprehensive Everglades Restoration Plan, a $7.8 billion, 30-year project, has changed the hydrological flow through the Greater Everglades ecosystem, influencing the suitability of habitat for deer. Habitat conditions also have changed as a result of altered fire ecology and the invasion of nonnative plant species. Furthermore, recent additions of coyotes (*Canis latrans*) and Burmese pythons (*Python bivittatus*), and increases in Florida panther and Florida black bear (*Ursus americanus floridanus*) abundance have altered the predator community. We explore the biological and cultural history of deer management in southern Florida to illustrate the challenges of deer management in a system where competing conservation and management goals and numerous interacting factors influencing deer population dynamics. Understanding these complex factors is critical to long term conservation and management of this popular game species while ensuring a sustainable prey base for Florida's native carnivores.

Key Words: conflict management, conservation and management challenge

Contact: elina.garrison@myfwc.com

NOTES:

Tuesday, 2:20 PM

Supplemental Feeding and Baiting Regulations: Do They Make Sense?

Authors

Tim Neuman, Ani-Logics Outdoors; Brian Dorcey, Veterinary Medical Center

Abstract

Many deer managers understand the importance of nutrition when trying to grow quality white-tailed deer. Most states allow food plots, but a growing number of states are restricting the ability of managers to use feed or minerals to increase available nutrients to their herd. In order to test if deer were getting enough minerals, we sent liver biopsy samples (N = 16) from free-ranging deer harvested in Minnesota, Missouri, and Wisconsin to the diagnostic lab at Iowa State University. We discovered micro and macro mineral deficiencies in all deer tested. There are conflicting ideologies regarding the use of supplements on free-ranging deer. Some states have banned using feed or minerals entirely. Other states have no restrictions on feeding or baiting. Many states make no distinction between baiting and supplemental feeding in their regulations. The disparity between rules and regulations throughout the states is confusing to hunters, the public, and conservation officers. Transparency from the scientific community is needed to address what is the best practice to allow managers to supplement the diet of free ranging deer. Most of the states that ban feeding and/or mineral use cite disease prevention as the main factor in their decision. In reality, many of the states that have banned feeding have realized increases in disease prevalence, possibly as a result of illegal feeding or inadequate nutrition. If feed and minerals were once again legalized, more managers would use it across the landscape, thus lowering the chance of deer congregating around limited (illegal) feed sites.

Key Words: feeding, baiting, regulations

Contact: tneuman@anilogics.com

NOTES:

Tuesday, 2:40 PM

State of the Whitetail: Trends in Harvest and Management Programs

Authors
Kip Adams, Quality Deer Management Association; Matt Ross, Quality Deer Management Association; Brian Murphy, Quality Deer Management Association

Abstract
Harvest trends are valuable for assessing state and regional deer management programs. We compared the antlered buck and antlerless harvests in 2015 to the prior 5-year average (2010-2014) for each state in the Midwest, Northeast and Southeast to monitor how the harvests changed during this period. Overall, the buck harvest declined 1 percent in 2015 from the 5-year average. The Midwest averaged 1.3, the Southeast 1.6, and the Northeast 2.2 bucks harvested per square mile (PSM). In 2015, the average percentage of the antlered buck harvest that was 1.5 and 3.5 years or older was 34 and 35 percent, respectively. The latter is the highest percentage ever reported, and it is higher than the percentage of yearlings and 2.5-year-olds harvested. The overall antlerless harvest declined 12 percent in 2015 from the 5-year average. The Midwest averaged 1.3, while the Southeast averaged 1.8, and the Northeast 2.4 antlerless deer harvested PSM. Fawns constituted 23 percent of the antlerless harvest in 2015, yearlings 19 percent, and 3.5-year-old and older does made up 37 percent. In 2015, 66 percent of deer were shot with a firearm, followed by 22 percent with a bow, 10 percent by muzzleloader, and 2 percent by other means. Buck age structures continue to build and deer herds continue to be balanced with what habitats can support. These are both bright signs for the future of deer hunting. Unfortunately, the spread of chronic wasting disease will make the increased buck age structures a heated management topic.

Key Words: whitetail, deer, harvest

Contact: kadams@qdma.com

NOTES:

Tuesday, 3:00 PM

Influence of Soil Nutrients on Plant Nutrition for White-tailed Deer

Authors

Craig A. Harper, University of Tennessee, Marcus A. Lashley, Mississippi State University, Jordan S. Nanney, University of Tennessee, Bronson K. Strickland, Mississippi State University

Abstract

Soil nutrient availability is considered strongly influential to white-tailed deer antler growth. Some studies have demonstrated deer in poorer soil resource regions tend to have smaller antlers with the proposed mechanism attributed to soil nutrients limiting plant quality. However, other studies have indicated plant nutrient quality is not limiting to deer morphometrics, even in the poorest soil resource regions. Thus, the relationship between soil nutrient availability, plant nutrition, and deer antler size warrants further investigation. In general, it is widely believed that a plant's nutrient concentration is directly related to soil nutrient availability. To test this hypothesis, we sampled 11 deer forage species with paired soil samples at 20 sites across 12 states and a wide range of soil productivity index values. Plant samples were analyzed via wet chemistry to determine crude protein (CP), digestibility, and nutrient availability. Soil samples were analyzed to determine pH and nutrient availability. Mixed-model ANOVA indicated soil pH and Ca increased with soil productivity index, as expected, but soil P and K did not. Forbs contained more CP than woody plants, but CP was not related to soil productivity index. Forage Ca increased with soil productivity index, but forage P and K did not. Regression analysis across sites explained >70% of the variation for all plant nutrients. Forage type or species explained almost all of the variation, whereas soil nutrient availability explained < 1%. We contend managing for high-quality forage (forbs) is more important than soil mineral variation with regard to providing deer adequate nutrition.

Key Words: soil nutrients, plant nutrition, antler growth

Contact: charper@utk.edu

NOTES:

TUESDAY. 2/28/2017. TECHNICAL SESSION IV

*Student Presenter

Tuesday, 3:40 PM

***20 Years of the Modern Vaginal Implant Transmitter: Then and Now**

Authors
Justin R. Dion, University of Delaware; Jacob L. Bowman, University of Delaware; Jacob M. Haus, University of Delaware; Joseph E. Rogerson, Delaware Department of Natural Resources and Environmental Control

Abstract
The modern winged Vaginal Implant Transmitter (VIT) was developed 20 years ago by Bowman and Jacobson (1998) to increase retention and eliminate the need for sutures. Recently, ATS developed the Neolink-ITX VIT which allows communication with the GPS collar and notifies researchers of a birth event via iridium satellite network. Two signals are sent via email with each birth; the first when the VIT temperature drops below 91 degrees and the second when the collar moves more than 6 ft. from VIT. We deployed 20 Neolink VITs and compared effectiveness to traditional VHF VITs. We had 4 equipment failures, 4 premature expulsions and 2 pre-birth mortalities, leaving us with 10 properly functioning VITs. Neolink systems resulted in substantial reductions of time spent monitoring the VIT signals before birth. We spent ~400 person-hours (48 person days) monitoring 4 VHF VITs. The Neolink systems required less than1 hour per day of monitoring. We captured 17 fawns from 10 functioning Neolink VITs (1.7 fawns/VIT) with 70% of birth events resulting in twins. The Neolink system gives the user the ability to continuously monitor each device in the study at the same time, eliminating the need for rotational monitoring and reducing time from birth event to search initiation. The use of Neolink VITs allows projects examining neonate fawn survival to increase sample size while reducing monitoring effort and labor costs.

Key Words: VIT, Neolink, Neonates

Contact: jdion@udel.edu

NOTES:

Tuesday, 4:00 PM

***Retention of Expandable Collars on Male White-tailed Deer**

Authors

Jacob M. Haus, University of Delaware; Jacob L. Bowman, University of Delaware; Joseph E. Rogerson, Delaware Department of Natural Resources and Environmental Control

Abstract

Advancements in telemetry technology have allowed for increasingly detailed analysis of spatiotemporal movement patterns in white-tailed deer. Due to both growth and seasonal swelling and shrinking of the neck, collar retention issues limit and complicate multi-year studies of male cohorts. We examined collar retention rates of expandable designs for an 825g GPS collar for adults (18+ months at capture) and a 340g expandable VHF collar for juveniles (6-10 months at capture). We used 2 expandable designs on GPS collars; a 1.5cm wide elastic band, and a 4cm wide length of pleated and stitched expandable material. VHF collars included a 1.5cm wide section of elastic band. We deployed 28 GPS collars and 61 VHF collars on male white-tailed deer in Sussex County, Delaware during winter 2014-2015 and 2015-2016. For adults, 12 GPS collars were lost prematurely with an average duration of 38.1 days (min = 1 day, max = 139 days). 16 GPS collars (57.1%) were retained until mortality or remote removal (max = 621). For juveniles, 5 VHF collars were lost prematurely with an average duration of 15.6 days (min = 1, max = 62). The remaining 56 collars (91.8%) were retained until mortality or remain active (max = 682). Retention rates for smaller package VHF collars were considered acceptable, however both expansion designs for GPS collars resulted in relatively low retention. We discuss expansion mechanism designs that have been used in our study, concerns regarding animal welfare, and potential options for improving GPS collar retention on adult males.

Key Words: collar, retention, GPS

Contact: jakehaus@udel.edu

NOTES:

Tuesday, 4:20 PM

***Estimating White-tailed Deer Fawn Survival and Recruitment with Spatial Capture-recapture Models and Camera Data**

Authors
Kristin N. Engebretsen, University of Georgia; Michael J. Cherry, Virginia Tech; Elina Garrison, Florida Fish and Wildlife Conservation Commission; Karl V. Miller, University of Georgia; Richard B. Chandler, University of Georgia

Abstract
In South Florida, white-tailed deer (*Odocoileus virginianus*) are the primary prey of the endangered Florida panther (*Puma concolor coryi*) and an economically and culturally important game species. Due to recent reported declines in deer populations, we are conducting a comprehensive study investigating the effects of hydrology, hunting, and predation on deer population dynamics. We developed a novel camera-based method for estimating fawn survival and recruitment using spatially-referenced encounter histories created for fawns identified by their unique spot patterns. These histories were analyzed using spatial capture-recapture models to estimate population parameters. We deployed 180 passive trail cameras across three grids in the Florida Panther National Wildlife Refuge and Big Cypress National Preserve. Using 1010 images from January 1st through May 10st 2016, we identified 29 unique fawns from one 60-camera grid. We estimated parameters including date and location of fawning, spatial variation in survival and recruitment, and changes in survival rates and detection probabilities with fawn age. Mean parturition date was February 16 (95% CI: Jan 28-Mar 15), and we estimated 61 (95% CI: 44-94) births in the 9490-acre study area. Survival estimates were relatively high compared to telemetry-based estimates from other southeast US studies, with 79.6% (95% CI: 59.2-93.4) of individuals surviving 30 days and 38.1% (95% CI: 12.2-62.7) surviving 180 days. Our method shows promise as a non-invasive approach to understanding the factors influencing fawn recruitment and survival at broad spatial and temporal scales. It is also much more cost-effective than traditional methods requiring capturing and collaring of neonates.

Key Words: spatial capture-recapture, recruitment, camera trapping

Contact: kne09c@uga.edu

NOTES:

Tuesday, 4:40 PM

***Do Preseason Camera Surveys Reflect Harvest Availability During the Hunting Season?**

Authors

James T. Johnson, University of Georgia; Michael J. Cherry, Virginia Tech; L. Mike Conner, Joseph W. Jones Ecological Research Center; Richard B. Chandler, University of Georgia; Brandon T. Rutledge, Joseph W. Jones Ecological Research Center; Charlie H. Killmaster, Georgia Department of Natural Resources; Michael T. Biggerstaff, University of Georgia; Karl V. Miller, University of Georgia

Abstract

Preseason baited camera surveys are a common method for monitoring white-tailed deer populations and establishing harvest objectives. However, surveys are typically conducted in late summer or early fall when sexual segregation is strongest and before bachelor groups separate. Therefore, it is unclear whether these surveys accurately describe the population available for harvest. To determine how well preseason baited surveys reflect harvestable populations, we conducted a preseason baited survey (one camera/100 acres) followed with passive camera surveys (one camera/50 acres) during the hunting season and a post season baited survey (one camera/100 acres) on three 2500 acre camera grids in southwestern Georgia. Our sites included a wide range of herd demographics, management schemes, and landscape connectivity. We collected 139,519 images before, during, and after the 2014-15 deer season from both baited and passive cameras. Preseason baited surveys estimated densities within the grids of 47, 61, and 126 adult deer/mile^2 with 82, 75, and 214 unique bucks, respectively. Of the bucks identified during preseason baited surveys, 12%, 25%, and 20%, respectively, were not observed during subsequent surveys. Additionally, unique bucks were identified during the passive and postseason surveys that were not observed preseason. The highest density site gained fewer unique bucks than the other sites, perhaps due to differences in herd dynamics or lower landscape connectivity. Our results suggest that preseason baited surveys may not accurately reflect the population available for harvest during the subsequent hunting season. Spatio-temporal dynamics of deer populations should be considered when establishing harvest recommendations.

Key Words: baited, camera, survey

Contact: jjohnson2@jonesctr.org

NOTES:

WEDNESDAY. 3/1/2017. TECHNICAL SESSION V

*Student Presenter

Wednesday, 8:10 AM

New World Screwworm Infestation of Key Deer

Authors

Rebecca Shuman, Florida Fish and Wildlife Conservation Commission; Samantha Gibbs, U.S. Fish and Wildlife Service; Mark Cunningham, Florida Fish and Wildlife Conservation Commission; Lara Cusak, Florida Fish and Wildlife Conservation Commission; Cory Morea, Florida Fish and Wildlife Conservation Commission

Abstract

The New World screwworm fly (*Cochliomyia hominivorax*) were once considered the most important parasite of white-tailed deer (*Odocoileus virginianus*) in Florida and Texas. The larvae consume living flesh, causing myiasis in livestock and wildlife often resulting in death if left untreated. Although still present in most of South America and several Caribbean countries, the fly was eradicated in the Southeast by 1959, and no infestations were documented in the United States since 1982. In September 2016, a local infestation of the screwworm fly was confirmed in the Florida Keys. All warm-blooded animals are susceptible to infestation; however, the majority of cases were documented in the endangered Key deer (O. v. clavium). Male deer were particularly susceptible due to the prevalence of open wounds related to breeding season behavior. By the end of November 2016, 132 deer had died due to the infestation. Primary eradication efforts involved biological control through the release of sterile flies. Additional efforts related to Key deer included euthanasia of individuals with severe myiasis, medication with oral or topical parasiticide, and immobilization and treatment of individuals with minor infestations. During October and November 2016, 3768 doses of parasiticide were dispensed, and 18 deer were immobilized and treated. These methods have helped to reduce the number of screwworm infestations of Key deer.

Key Words: screwworm, Key deer, myiasis

Contact: becky.shuman@myfwc.com

NOTES:

Wednesday, 8:30 AM

***New World Screwworm Impacts on the Endangered Florida Key Deer**

Authors

Jared Beaver, Israel Parker, Brian Pierce, Texas A&M University; Kate Watts, U.S. Fish and Wildlife Service; Nova Silvy, Texas A&M University; Roel Lopez, Texas A&M University

Abstract

In July 2016, Florida Key deer (*Odocoileus virginianus clavium*), were confirmed to have New World screwworm (*Cochliomyia hominivorax*). Screwworm is a threat to U.S. agricultural interests and wildlife populations, prompting an immediate response from federal, state, and local agencies to stop further expansion in North America and eradicate the current infestation in the Lower Florida Keys. Study objectives were to (1) characterize screwworm-related mortalities and (2) assess infestation impacts on population density, sex-age structure, and viability. Approximately 15% of the Key deer population were euthanized and/or died due to screwworm infections (n = 127 deer mortalities) between July–October 2016. However, mortalities have decreased (-92%) in November 2016 following aggressive sterile fly release efforts by USDA and USFWS. Adult males were disproportionately impacted by screwworm infestations (91%) which is attributed to rut-related injuries. Sex ratios shifted with adult male mortalities and were slightly higher (4.12:1 females:males, current) compared to the historic average (3.76:1). An estimated 678 Key deer occupy Big Pine and No Name keys (core population) post-screwworm incident. Estimates suggest the population is viable with enough males currently available to complete the breeding season. However, during fawning, screwworm infestations could shift to adult females and fawns (e.g., vaginal discharge, umbilicus) and would have significant population impacts. We recommend monitoring of adult females as an early screwworm detection strategy prior to fawning, and the evaluation of other strategies (e.g., population assessment of non-core islands and translocations) as possible approaches to accelerate Key deer recovery efforts following screwworm eradication.

Key Words: density, disease, Key deer, population, screwworm

Contact: jbeaver@ag.tamu.edu

NOTES:

Wednesday, 8:50 AM

Is Drought a Risk Factor for Hemorrhagic Disease in the Eastern United States?

Authors
David Stallknecht, Southeastern Cooperative Wildlife Disease Study; Mark Ruder, Southeastern Cooperative Wildlife Disease Study; John Fischer, Southeastern Cooperative Wildlife Disease Study; Sonja Christensen, Michigan State University

Abstract
Hemorrhagic disease (HD) is the most important viral disease of white-tailed deer (*Odocoileus virginianus*) in the eastern United States but our understanding of HD risk factors is incomplete. A temporal relationship has been documented between drought and HD outbreaks in the northeastern U.S. The objectives of this study were to: 1) determine if a relationship between drought and reported HD can be demonstrated on a spatial scale; and 2) to determine if the importance of this potential risk factor varies over the present range of HD in the eastern United States. Historic data (2000-2014) from an annual survey conducted by the Southeastern Cooperative Wildlife Disease Study and from the United States Drought Monitor were used for this analysis. For each of 23 states, individual counties were categorized based on reported drought status during the last week of August. The frequency of reported HD for each drought category was determined and a relative risk estimate was calculated for each drought category by state and for three multistate regions (north, central, and south). The probability of reported HD increased with each drought category in most states and in all regions. However, this increase was most pronounced in northern states; the effect was much reduced or non-existent in most southern states. These relationships suggest that drought severity does increase the probability that HD will be detected and reported at a county level, but in endemic areas in the southern U.S., the importance of drought as a predictor of HD risk is low.

Key Words: hemorrhagic disease, drought, risk factor

Contact: dstall@uga.edu

NOTES:

Wednesday, 9:10 AM

Epizootic Hemorrhagic Disease Virus Serotype 6 in the United States: The First 10 Years (2006-2015)

Authors
Mark G. Ruder, Southeastern Cooperative Wildlife Disease Study; Donna Johnson, National Veterinary Services Laboratories; Eileen Ostlund, National Veterinary Services Laboratories; Andrew B. Allison, Virginia Tech; Clara Kienzle, Southeastern Cooperative Wildlife Disease Study; Jamie E. Phillips, Aalto Scientific; Rebecca L. Poulson, Southeastern Cooperative Wildlife Disease Study; David E. Stallknecht, Southeastern Cooperative Wildlife Disease Study

Abstract
Epizootic hemorrhagic disease (EHD) virus (EHDV) is a Culicoides-transmitted orbivirus (family Reoviridae) of wild and domestic ruminants and is an important pathogen of white-tailed deer (*Odocoileus virginianus*). Historically, only two serotypes, EHDV-1 and EHDV-2, have circulated among vector and ruminant populations in the United States. However, in 2006, an exotic serotype (EHDV-6) was first detected in the USA by a long-term passive surveillance system for EHDV and bluetongue viruses (BTV). Genetic characterization revealed the virus was a genetic reassortant EHDV between serotype 2 (endemic) and serotype 6 (exotic). In addition to EHDV-6, numerous exotic BTV serotypes have been isolated from wild and domestic ruminants in the USA since 1999. Collectively, the detection of these exotic viruses in the USA is of concern for wildlife and livestock health and the potential for these viruses to become established is largely undetermined. Here, we report EHDV-6 detections made through passive surveillance efforts by the Southeastern Cooperative Wildlife Disease Study (University of Georgia, Athens, GA USA) and the National Veterinary Services Laboratories (United States Department of Agriculture, Ames, IA USA) over a 10-year period (2006-2015). The results demonstrate that EHDV-6 has been detected from ruminants every year since 2006 and appears widely distributed throughout the central and eastern USA. This study highlights the importance of this passive surveillance system for EHDV and BTV. Further, the findings suggest EHDV-6 is likely established in the USA and represents a third EHDV serotype actively circulating among ruminant and vector populations.

Key Words: epizootic hemorrhagic disease virus serotype 6, hemorrhagic disease, orbivirus, vector-borne disease, white-tailed deer

Contact: mgruder@uga.edu

NOTES:

Wednesday, 9:30 AM

***Genetic Contribution of Northern Lineages to Free-range Populations of White-tailed Deer in Southcentral U.S**

Authors
Jordan L. Youngmann, Mississippi State University; Steve Demarais, Mississippi State University; Randy W. DeYoung, Texas A&M University-Kingsville; Bronson Strickland, Mississippi State University

Abstract
Current populations of white-tailed deer in the southeast United States are genetically admixed as a result of historic translocations during the mid-1900s to restore dwindling numbers. Translocated individuals came from remnant, native stock as well as across the country including northern deer from Michigan, Wisconsin, and New York. Although the adaptive ability of these individuals to withstand drastically different climates and novel diseases is questionable, little is known about their long-term contribution to the current genetic structure of southeastern deer. We sampled free-range populations across Louisiana, Mississippi, and Alabama at sites with known historic translocations of northern deer as well as stock source populations from Iron Mountain, MI; Sandhill Wildlife Area, WI; and the Adirondacks in NY. Genetic relationships were tested through the use of 15 microsatellite DNA markers. Southeastern populations were admixed and loosely divided east to west along the Mississippi River with further substructure apparent in populations that received deer from North Carolina as well as native Alabama populations that received no stocking. Analysis of genetic distance revealed a relationship between Black Warrior WMA in Alabama, and Iron Mountain, MI which provided 105 (74%) translocated deer to that area. This was the only evidence of northern lineages still present in these southeastern populations. It is clear that careful consideration must be taken in choosing stock sources for restoration efforts. This research brings to light the potential inefficacy of using sources from vastly different climates and evolutionary histories.

Key Words: genetics, restoration, adaptation

Contact: jly107@msstate.edu

NOTES:

WEDNESDAY. 3/1/2017. TECHNICAL SESSION VI

Wednesday, 10:10 AM

*Factors Influencing Nutritional Condition of White-tailed Deer in the Appalachian Mountains of Virginia

Authors
Andrew B. Kniowski, Virginia Tech; Michael J. Cherry, Virginia Tech; Nelson W. Lafon, Virginia Department of Game and Inland Fisheries; David E. Steffen, Virginia Department of Game and Inland Fisheries; W. Matt Knox, Virginia Department of Game and Inland Fisheries; W. Mark Ford, U.S. Geological Survey

Abstract
The relationships between hard mast abundance and physiological response in central and southern Appalachian white-tailed deer (*Odocoileus virginianus*) herds are well established. However, previous investigations have not incorporated parameters such as landscape composition, winter severity, or herd density that also might influence deer physiological condition. Accordingly, we used biological data collected at hunter check stations in the Blue Ridge and Ridge and Valley provinces of Virginia to model the response of yearling male and female body mass, as well as yearling antler characteristics (i.e., beam diameter and number of antler points) to mast abundance, winter severity, forest composition, and deer density for 25 counties during 1991-2000. Largely independent of proportion of a county forested, male and female yearling body mass was higher in successive years when the fawn and yearling periods encompassed good mast crops. However, when one or both years had poor mast, body mass decreased as the proportion of the county forested increased. Mountain counties with more open habitats were somewhat buffered against the density-independent mast driver that managers have little ability to control. The number of antler points was negatively related to the proportion forested, whereas beam diameter was negatively related to herd density. Our results suggest that in heavily forested mountain counties with large public or corporate holdings, creation of early-successional habitat using timber management, prescribed burning or mine land reclamation could improve deer nutritional condition. In counties with a mosaic of forested and open habitats, managers can improve physiological metrics by reducing herd density.

Key Words: hard mast, landscape composition, body condition

Contact: mjcherry@vt.edu

NOTES:

Wednesday, 10:30 AM

A Comparison of Results from USDA and Farm Bureau Survey Efforts Regarding Deer in Missouri

Authors
Ronald Reitz, Missouri Department of Conservation

Abstract
The Missouri Department of Conservation (MDC), in cooperation with United States Department of Agriculture (USDA), conducts annual surveys of agricultural operators/producers in Missouri to measure opinions and attitudes related to deer and deer management. In 2016, during the same period that USDA administered the "Agricultural Land and Deer in Missouri" survey, MDC collaborated with Missouri Farm Bureau to conduct the same survey of their farmer members to better understand similarities and differences between the two populations. Both surveys were administered following recommendations by Dillman (2014). Statistical differences in attitudes and opinions regarding deer and deer management were observed between the groups. Characteristics of Farm Bureau members (i.e., larger acreage operated and higher proportion of land use in crops), compared to USDA respondents, likely explain these differences. For both groups, these two characteristics were similarly correlated with current perceptions of deer populations and opinions on how deer should be managed in the future, with Farm Bureau members being less agreeable toward increasing deer populations and less satisfied with current deer management. While overall response distributions for both groups were similar, with the plurality or majority of respondents typically falling in the middle categories on many items (i.e., "about the right number of deer" or "should manage for a stable population of deer"), disparities in response on some key questions could indicate a need for targeted management actions to assist operators of larger acreages, such as Farm Bureau's farmer members, for whom deer management challenges are likely greatest.

Key Words: deer, human dimensions, surveys

Contact: ron.reitz@mdc.mo.gov

NOTES:

Wednesday, 10:50 AM

***Modeling Nutritional Carrying Capacity and Summer Forage Distribution for Deer in the Cumberland Mountains, Tennessee**

Authors
Jordan Nanney, University of Tennessee; Craig Harper, University of Tennessee; David Buehler, University of Tennessee; Gary Bates, University of Tennessee

Abstract
Summer nutrition has a tremendous influence on body growth, antler growth, and reproductive success of white-tailed deer (*Odocoileus virginianus*). Although nutrition is one of the most manageable components of deer habitat, nutritionally limiting portions of properties often are not identified. The availability and distribution of summer forage is an important consideration for deer managers working to maximize productivity of the deer herd on their property or management area. Providing an opportunity to visualize the distribution of deer forage resources from an aerial perspective could enable deer managers to easily identify and strategically address nutritional limitations for deer on their property or management area. We developed a spatially-explicit forage model to estimate summer nutritional carrying capacity (NCC) and evaluate the distribution of summer deer forage across the North Cumberland Wildlife Management Area (WMA) in the Cumberland Mountains of Tennessee. We combined land cover data, site-specific forest management data, site-specific field management data, and 3 years of site-specific summer forage availability data to model NCC using the ordinary kriging interpolation method in ArcMap 10.4. Our model output displayed the distribution of summer forage across the WMA and indicated overall NCC was being negatively impacted by widespread coverage of closed-canopy forest on specific portions of the property. Our model proved to be a valuable decision-making tool to aid future deer habitat management decisions on the WMA and can be modified easily to assist deer managers in any region of the whitetail's range.

Key Words: nutritional carrying capacity, forage availability, ArcMap

Contact: jnanney@quailforever.org

NOTES:

Wednesday, 11:10 AM

Consistency and Reliability of Deer Ages from Central Florida

Authors

Donal A. Woodard, Deseret Ranches; Justin Field, Deseret Ranches

Abstract

In 2015 we began a study on our property to measure the consistency and reliability of our deer ages by collecting Tooth Replacement and Wear (TRW) age and a two cementum annuli (CA) age estimates for each male deer. Out of 209 paired samples; 99 paired incisors were sent to the same lab and the remaining 110 pair were sent to separate labs. First Sample: 15 of the 99 (15%) pairs of incisors came back the same age and only 5 of 99 (5%) had both matching CA ages and TRW. 50 of the 99 (51%) CA's were within one year and the remaining 34% were over one year apart. Second sample: 22 of 110 (20%) were estimated at the same age and only 10% had matching CA and TWR ages. 46 of 110 (42%) CA's were within one year and the remaining 38% were over one year. Individual CA results compared to TWR ages showed no consistent patterns, so bucks were categorized based on TWR into young (1.5-2.5 year olds), middle (3.5-4.5 year olds), and mature (5.5 + years old). 36% of duplicate CA ages fell within TWR categories with the remaining 64% had one or both CA ages falling outside the TWR category. Placing paired CA ages into same categories without using TWR ages we found 49% of paired CA ages were in the same category while 51% had one age that fell into different categories. This study revealed a lack of reliability of our aging processes. Factors influencing aging may involve environmental impacts, nutritional factors, regional climates, and lab techniques. This project is ongoing and the planning processes have begun to form known-age data samples.

Key Words: cementum annuli, deer aging, tooth replacement and ware

Contact: awoodard@deseretranches.com

NOTES:

Wednesday, 11:30 AM

***Evaluation of Culling Intensity and Criteria for Antler Traits in White-tailed Deer**

Authors

Masahiro Ohnishi, Texas A&M University-Kingsville; Randy W. DeYoung, Texas A&M University-Kingsville; Charles A. DeYoung, Texas A&M University-Kingsville; Bronson Strickland, Mississippi State University; Steven Lukefahr, Texas A&M University-Kingsville; Don A. Draeger, Comanche Ranch; David G. Hewitt, Texas A&M University-Kingsville

Abstract

Culling, or selective harvest, is a widely practiced strategy aimed at increasing antler size in managed populations of cervids. Microevolution of phenotypic traits through selection has long been practiced in laboratory or domestic populations, but the effect of culling on wild populations is poorly documented. Ideally, the offspring sired by desirable males should display improved antler traits after culling. However, young individuals may not be able to express their phenotypic potential in variable environments. We evaluated the effects of culling intensity and culling criteria as part of a long-term experimental study of white-tailed deer in southern Texas. We established 3 treatments including, intensive culling (3,500 acres), moderate culling (18,000 acres), and control (5,000 acres). Each autumn during 2006–2015, we captured male deer, estimated age, and measured antler characteristics. Deer that did not meet culling criteria for their age class were sacrificed during 2006–2012. We recorded 4,264 captures of 2,503 individual bucks, and culled 1,333. Most bucks were sired by males that exceeded the culling criteria. Nonetheless, culling intensity in the yearling age class (intensive treatment) ranged annually from 50 to 100% of bucks captured. Forty-eight percent of yearlings classified as culls would transition from cull to acceptable at 2.5 years old, while 33% would transition from acceptable to culls. In the south Texas environment, phenotypes of physically immature males may not correlate to their genetic potential. The results of this study will have important management implications for harvest management, including antler restrictions common in Southeastern States.

Key Words: culling criteria, transition frequency, antler traits

Contact: mohn896@gmail.com

NOTES:

Wednesday, 11:50 PM

***Effects of Resource Density, Deer Age, and Sex on a Concentrated Resource by White-tailed Deer**

Authors
Emily H. Belser, David G. Hewitt, Timothy E. Fulbright, Charles A. DeYoung, David B. Wester – Texas A&M University–Kingsville; Thomas W. Boutton, Texas A&M University; Don A. Draeger, Comanche Ranch

Abstract
Providing a concentrated resource such as pelleted feed for white-tailed deer is a common management practice in some areas. However, dominance hierarchies among deer may limit accessibility to such resources for some groups, particularly does and fawns. Social exclusion may become exacerbated with increasing deer density. Increasing feeder density may provide more opportunities for subordinate deer to access feed. To test these hypotheses, pelleted feed was provided year-round, ad libitum within four, 200-ac enclosures on two ranches in Texas with the following numbers of deer and feeders, respectively: 20/1, 60/1, 60/3, and 80/4. We used carbon stable isotope signatures in deer tissues to estimate proportion of feed in deer diets during February, March, September, and December. We used a linear mixed model for each month to determine effects of treatment, deer age, and sex on supplement consumption. These effects varied seasonally. In February and March, yearling and adult male diets had a higher proportion of feed (>84%) than female diets (< 70%). In September, female diets had a higher proportion of feed in treatments with >1 feeder (92% and 93%) compared to treatments with one feeder (63% and 79%). Males had a higher proportion of feed in diet (89%) than females (< 76%) at low deer density but not high deer density. In December, proportion of feed in adult diets (>93%) was higher than in fawn diets (< 76%). These results suggest young deer and female deer have less access to supplement and that increasing feeder density may reduce social exclusion.

Key Words: supplemental feed, density, social exclusion

Contact: emily.belser@students.tamuk.edu
NOTES:

Wednesday, 1:40 PM

***Comparison of Adult Urban and Rural White-tailed Deer Space Use in Southern Indiana**

Authors
Jonathan K. Trudeau, Ball State University; Garrett B. Clevinger, Ball State University; Timothy C. Carter, Ball State University

Abstract
White-tailed deer (*Odocoileus virginianus*) have been extensively researched throughout their distribution and in varying habitats. Urban deer research has grown in popularity due to increasing densities of white-tailed deer in many developed areas. Though much is known about urban and rural deer populations, little is known about how these two populations differ in response to the effects of urbanization. In particular, understanding the differences between urban and rural white-tailed deer space use in adjacent areas is essential to effectively manage the two populations. We are particularly interested in home range and core area size and how they may differ between adjacent areas during the same time period. Our study took place in Morgan, Monroe, and Brown counties in southern Indiana. The City of Bloomington, IN is similar to many moderate sized cities in that it has high densities of homes and a healthy urban white-tailed deer population. Using a drop net, dart projectors, suspended net-gun, and clover traps we captured 41 rural and 45 urban adult white-tailed deer between January and July of 2015/2016. Of the 85 deer collared, 51 had Global Positioning System (GPS) collars and 34 had VHF radio transmitter collars. Locations were collected every 8-6 hours on GPS collars and 2-4 times a week on radio transmitter collars. We predicted that the urban population would have smaller home ranges than the rural population, but found urban class to have little effect on home range size ($p=0.339$). Males had larger home ranges than females ($p < 0.001$), suggesting sex has a larger influence on home range size than urban class.

Key Words: home range, core area, urban

Contact: jktrudeau@bsu.edu

NOTES:

Wednesday, 2:00 PM

***A Comparison of White-tailed Deer Recruitment Rates to Relative Predator Abundance in Maryland**

Authors
Eric Ness, University of Delaware; Jacob L. Bowman, University of Delaware; Brian Eyler, Maryland Department of Natural Resources

Abstract
Predation of white-tailed deer can affect deer density and recruitment rates. Evidence of this effect, however, has been highly variable across the white-tailed deer range. Due to this variability, determining the relationship between predator density and deer demographic rates is valuable for localized management practices. To quantify this relationship, extensive effort is required to monitor individuals and determine the cause of death. Although providing robust information on the predator-prey relationship, this monitoring can be costly and time consuming. Using noninvasive surveys, we investigated if the density of predators is associated with the density and recruitment of deer within our study area of western Maryland. Deer density and fawn recruitment were estimated using 6 distance surveys on 30mi road transects from August-October 2015 and 2016. Across our 3 study sites, deer density ranged from 14-19 deer/mi2 in 2015 and 16-27 deer/mi2 in 2016. Fawn recruitment ranged from 0.57-0.59 (fawn/doe) in 2015 and 0.53-0.57 (fawn/doe) in 2016. Predator densities were estimated with package unmarked for program R using a 60 day camera survey from June-August 2015 and 2016. Predator densities of black bear (2015=1.58-1.67/mi2, 2016=0.62-1.21/mi2), coyote (2015=0.04-0.40/mi2, 2016=0.91-4.74/mi2), and bobcat (2015=0.11-0.19/mi2, 2016=0.06-2.33/mi2) did not differ among our study sites. Additionally, we compared fawn recruitment estimates based on harvest data from other counties of Maryland where predator communities are not well established. This information will allow managers to determine if fawn recruitment differs with changes in predator communities.

Key Words: predator-prey relationship, camera survey, distance sampling

Contact: eness@udel.edu

NOTES:

Wednesday, 2:20 PM

***Survival and Cause-specific Mortality of Adult White-tailed Deer on Public and Private Lands**

Authors
Kevyn H. Wiskirchen, Auburn University; Todd C. Jacobsen, Auburn University; Stephen S. Ditchkoff, Auburn University; Steve Demarais, Mississippi State University; James B. Grand, U.S. Geological Survey

Abstract
The importance of science-based decision-making within natural resource management is now widely recognized. With regards to the management of white-tailed deer, regional estimates of survival and cause-specific mortality are valuable for guiding harvest recommendations that will promote healthy and sustainable populations. While hunter harvest has a significant impact on adult white-tailed deer survival across much of the species range, attitudes and selective preferences may vary between public- and private-land hunters, creating the potential for vast differences in deer population dynamics between land-ownership types. While this possibility has not yet been thoroughly explored, such differences may present a challenge to state agencies whose management strategies are based on information from a single land-ownership type. From 2014-2016, we radio-marked and monitored the survival of adult white-tailed deer on public and private land in Alabama. We assessed the relative importance of covariates including sex, age, and land-ownership type (i.e., public vs. private land) on overall survival and hunting-related mortality using an information-theoretic approach. Hunter harvest accounted for 77% of all observed mortalities. However, harvest-related mortality did not vary between public and private study areas, likely as a result of Quality Deer Management practices on private land that emulated the effects of more restrictive harvest regulations on public land. Our findings suggest that adult deer survival rates may be broadly applicable where harvest restrictions on public land are in excess of those on private property. However, where restrictions apply evenly across land-ownership types, differences in harvest rates and overall survival may exist.

Key Words: hunter-harvest, public vs. private land, survival

Contact: khw0005@auburn.edu

NOTES:

Wednesday, 2:40 PM

***Factors Affecting Survival of Neonatal White-tailed Deer in Missouri**

Authors

Chloe A. Wright, University of Montana; Jon T. McRoberts, University of Missouri; Joshua J. Millspaugh, University of Montana; Barbara J. Keller, Missouri Department of Conservation

Abstract

Neonatal white-tailed deer (*Odocoileus virginianus*) experience the highest and most variable mortality rates compared to other life stages and understanding their survival rates is important for making informed management decisions. We quantified neonate survival through the first 8 weeks of life, and tried to determine if neonate survival was affected by doe habitat use in the glaciated plains (GP) and Ozark (OZ) ecoregions of Missouri. Both ecoregions comprise about 1/3 of the state and differ in land ownership, habitat characteristics, and land use. We captured pregnant female deer from January – March 2015-16, fitted them with GPS radio-collars and implanted a vaginal implant transmitter (VIT) that notified us when birth occurred. We captured 142 neonates during May – June 2015-16, fitted them with an expandable radio collar, monitored survival status daily, and promptly investigated mortalities. In 2015, neonate survival in the GP was 19/29 (65.5%) and 13/27 (48.1%) in the OZ. In 2016, neonate survival in the GP decreased by nearly 30% to 16/42 (38.1%) and was similar to 2015 in the OZ at 24/44 (54.5%). We observed predation, starvation, drowning, and injury as causes of mortality. However, consumption by predators or scavengers resulted in the majority of mortalities being classified as unknown. Our results will enable more efficient management of white-tailed deer in Missouri through updated population models and management recommendations.

Key Words: neonates, survival, Missouri

Contact: chloe.wright@umontana.edu

NOTES:

Wednesday, 3:00 PM

***Dead Downwind: Quantifying Caution in White-tailed Deer**

Authors

Daniel Crawford, University of Georgia; Michael J. Cherry, Virginia Tech; Brian Kelly, University of Georgia; Richard B. Chandler, University of Georgia; Elina Garrison, Florida Fish and Wildlife Conservation Commission; L. Mike Conner, Joseph Jones Ecological Research Center; Karl V. Miller, University of Georgia

Abstract

Prey species are faced with the conundrum of optimizing behavioral decision-making in the context of spatially and temporally variable risk of predation. However, behavioral decisions are not made on the basis of actual risk, but perceived risk. The senses used by prey to perceive cues of predator presence vary depending on life histories of the prey and predator. White-tailed deer (*Odocoileus virginianus*) rely on visual, audible, and olfactory cues when assessing predation risk and alter behavior accordingly as they attempt to forage optimally. While many studies have investigated the effects of environmental variables on white-tailed deer movement, little is known about the effects of such variables on anti-predator behaviors. We examined the effects of wind speed, direction, and habitat type on space use of deer within the primary range of the endangered Florida panther (*Puma concolor coryi*) using generalized liner mixed effects models, data from on-site weather stations, and relocation data from GPS-telemetered deer (n=172) collected from December 2014 to November 2016. We observed significant interactive effects of distance to edge and wind speed ($p = 0.002$) as well as distance to edge and habitat type ($p < 0.001$) on approach angles to closed canopy. Decreasing distance to edge decreased angular disparity between wind bearing and bearing to closed canopy as did increased wind speed. While anecdotal evidence has long suggested these effects, this is the first study, of which we are aware, to quantify the effects of wind on the relative spatial orientation of deer to high risk areas.

Key Words: predation risk, wind, anti-predator behavior

Contact: bigdmail@uga.edu

NOTES:

Wednesday, 3:40 PM

Community Deer Management in Town & Country, Missouri: Sharpshooting and Sterilization to Reduce Deer Density

Authors
Erin Shank, Missouri Department of Conservation

Abstract
The City of Town and Country, located in St. Louis County, Missouri, has a long history of struggles with suburban deer management. The City implemented a deer management plan in 2009 using a dual approach to reducing deer densities: surgical sterilization of does and sharpshooting. Missouri Department of Conservation staff have worked with the City throughout management implementation over the past 8 years to implement management strategies. Surgical sterilization of 130 does occurred over the course of the first two years of management. Veterinarians performed ovarectomies and tubal ligations on does that were captured via drop nets and mobile darting. Trained marksmen culled deer over bait each year, harvesting 987 deer over seven seasons. The City deer densities have been reduced from approximately 65 deer per square mile to 46 deer per square mile throughout a 10-square mile area. The presentation will cover management implementation, outcomes, evaluation through distance sampling, future options for deer management in Town & Country, and the unique considerations of suburban deer management.

Key Words: suburban deer management, sharpshooting, distance sampling

Contact: erin.shank@mdc.mo.gov

NOTES:

Wednesday, 4:00 PM

A Changing Landscape in the Northern Georgia Mountains: Bear, Deer, and Forests

Authors

Andrew R. Little, University of Georgia; Gino J. D'Angelo, University of Georgia; Charlie H. Killmaster, Georgia Department of Natural Resources; Kristina L. Johannsen, Georgia Department of Natural Resources; Karl V. Miller, University of Georgia

Abstract

The Georgia Department of Natural Resources–Wildlife Resources Division documented a 93.1% decline (n = 684 in 1979; n = 47 in 2015) in male white-tailed deer (*Odocoileus virginianus*) harvest on wildlife management areas (WMAs) located in the northern Georgia mountains. Changing forest conditions and increased fawn predation by black bears (*Ursus americanus*) and coyotes (*Canis latrans*) have been speculated to be responsible for the observed declines. Therefore, we evaluated black bear population trends, forest succession, and deer condition indicators (i.e., body weights, antler size) on 8 WMAs from 1979-2015. Using age-at-harvest data, population reconstruction illustrated an increasing trend in the black bear population (males: $\lambda = 1.07$; females: $\lambda = 1.08$). Limited timber management on the WMAs resulted in forest maturation and reduced coverage of early successional habitat (< 10 years of age) from 4.7% to 0.1% during the same period. Although maturing forest conditions limited forage availability from early successional habitats, mean body weights and antler beam diameters of yearling male deer increased, suggesting improved nutritional conditions. Therefore, our research suggests that declining deer populations may be the result of decreased fawn recruitment due to predation, rather than declines in fecundity. Also, declining availability of early successional habitats may contribute to reduced fawn survival by limiting cover for deer and alternative food sources for predators. Our future research will evaluate survival, cause-specific mortality, and habitat use of does and fawns to aid in understanding factors affecting the declining deer population in the northern Georgia mountains.

Key Words: harvest, predators, succession

Contact: alittle@uga.edu

NOTES:

Wednesday, 4:20 PM

From Ridiculed to Recognized: 22 Years of Deer Research and Management on Hilton Head, SC

Authors

David Henderson, Community Services Associates; Robert Warren, University of Georgia; Charles Ruth, South Carolina Department of Natural Resources

Abstract

Sea Pines (SP) is a 5,300-acre residential/resort community on Hilton Head, SC. Traditional white-tailed deer (*Odocoileus virginianus*) hunting is not feasible due to municipal ordinance. As development in SP neared completion, the owners association (Community Services Associates [CSA]) began receiving complaints regarding deer-human conflicts. In 1995 the University of Georgia (UGA) developed a research project to provide CSA and the South Carolina Department of Natural Resources (SCDNR) with biologically sound data needed to manage deer on SP. The project received a great deal of local, state, national and international media attention. Local newspapers questioned the project and editorials included professional ridicule. In 1998 the original project was completed and UGA proposed a follow-up project that included lethal removal. Five local, state and national animal activist groups organized a coalition and in 1998 filed a lawsuit, ultimately heard by the South Carolina Supreme Court (SCSC) in 2000. In 2001 the SCSC ruled in favor of CSA and SCDNR; however, CSA decided to forgo the follow-up project and opted instead to implement a culling program made possible by recently approved SCDNR Urban Deer Management Guidelines. Since 2001 CSA has utilized sharpshooting to discretely remove 965 deer without incident. Deer-vehicle collisions and complaints of landscape depredation have decreased substantially. Local media, once a source of ridicule, now recognize the merit of these programs. Successfully managing deer in an emotionally, legally, and politically charged environment can be challenging for wildlife professionals. A description of lessons learned while operating amid such controversy will be presented.

Key Words: urban deer, controversy

Contact: wildlife@csaseapines.com

NOTES:

Wednesday, 4:40 PM

Organized Archery Hunting to Manage White-tailed Deer Populations in Fairfax County, Virginia

Authors
Kevin R Rose, Virginia Department of Game and Inland Fisheries; Katherine Edwards, Fairfax County Police Department

Abstract
Archery hunting is an important deer management tool that can play a critical role in deer population control efforts in urban and suburban areas. Fairfax County, Virginia implemented a deer management program on public lands in 1998 to address county and state-wide deer management challenges associated with public safety, environmental damage, deer herd health, and other conflicts. Shotgun hunts and sharpshooting were implemented in a small number of county parks given strict firearms restrictions and showed limited success with an average of 220 deer harvested per year. Archery was added in 2010 to supplement existing methods given the high costs associated with sharpshooting operations and limited ability to expand the program under local firearms ordinances. The archery program now includes over 100 properties county-wide totaling over 19,000 acres. Over 600 volunteer archers are organized into groups that are assigned clusters of parks with group leaders, strict rules of engagement, and reporting requirements. The archery program has accounted for 75.7% of total program harvest since 2011. Volunteer archers harvested 1,052 deer in 2015-16 representing 92.1% of the harvest with over 67% percent being does. Opponents to the program have criticized archery deer hunting for resulting in high wounding rates and excessive suffering. Non-recovery rates have varied between 4-6.6% and are well below the historic archery hunting reports. Herein, we present the history and evolution of the Fairfax County Deer Management Program as a successful model of a structured urban archery deer management program in a densely populated and developed area.

Key Words: urban, archery, program

Contact: kevin.rose@dgif.virginia.gov

NOTES:

POSTER ABSTRACTS

*Student Presenter

P-01 *To Bait or Not to Bait: Comparing Camera Survey Methods for White-tailed Deer Population Estimation

Authors
Robert Baldwin, Wake Forest University; Jared Beaver; Michael Anderson; Matt Windsor; Miles Silman

Abstract
Infrared-triggered camera surveys are an increasingly popular technique for white-tailed deer (*Odocoileus virginianus*; hereafter deer) estimation because they are less invasive, less labor intensive, and more cost effective than other methods. Current camera survey methods, however, rely on the use of bait as an attractant, exposing deer population estimates to biases due to unequal detectability of animals. Few studies have directly compared baited verses un-baited camera surveys for deer estimation. We conducted an un-baited and baited camera survey at Pilot Mountain State Park, NC, USA from July 1 ?" September 29 and September 30 ?" October 14 2016; respectively. We had 22 camera site locations (1 camera/100 acres). Photos were analyzed using Jacobson et al.'s (1997) method. We had a total of 1658 and 60508 deer visits for un-baited and baited surveys respectively. Density estimates increased by 61% and sex ratios (females:males) decreased nearly twofold for un-baited and baited surveys, indicating unequal detectability between sexes in the presence of bait. Fawn recruitment rate estimates were identical between surveys. Frequency distribution of hourly deer visitations differed between surveys, giving further indication of behavioral changes due to baiting. However, both surveys are limited by the necessity of identifying individual bucks. Future efforts will focus on providing a comparison of un-baited and baited surveys using both traditional analyses and new models not reliant on individual identification. This study improves the effectiveness of cameras as a survey tool by providing managers with a more complete understanding of biases involved in generating population estimates.

Contact: **baldrw13@wfu.edu**

NOTES:

Poster Session

P-02 *Using Passive Cameras to Monitor Deer Activity Patterns During the Breeding Season

Authors
Michael T. Biggerstaff, University of Georgia; Michael J. Cherry, Virginia Tech University; L. Mike Conner, Joseph W. Jones Ecological Research Center; Richard B. Chandler, University of Georgia; Charlie Killmaster, Georgia Department of Natural Resources; James T. Johnson, University of Georgia; Karl V. Miller, University of Georgia

Abstract
It is important for deer managers to understand the chronology of reproduction to ensure that the hunting season includes the rut. Accessing the timing of the rut can be done by evaluating conception data, but may also be estimated examining deer activity patterns. We evaluated the potential to estimate the timing of the rut with activity pattern data collected from passive camera surveys. We deployed passive IR cameras (1 camera/50 acres) on three 2500 acre grids in southwestern Georgia with different management regimes, herd characteristics and assumed timing of reproduction. Between September 2014 and September 2016, we collected 88,409 observations of deer. We used conception dates calculated from fetal measurements to establish a true measurement of peak reproduction and assessed the ability to predict that date with count data for adult males, yearling males, adult females, and fawns. Detection of yearling bucks and adult females did not vary during the breeding season, suggesting that their movements should not be used as an indicator of timing of the breeding season. However, the counts of adult buck photos peaked just prior to the estimated conception date. Our findings indicate that the count of adult bucks in passive camera surveys may be used to monitor chronology of the breeding season for white-tailed deer.

Contact: **mtbigger@uga.edu**

NOTES:

Poster Session

P-03 *Varying Perceptions of Coyotes Within the Hunting Community

Authors
C. Moriah Boggess, North Carolina State University; Mark A. Turner, North Carolina State University; Michael D. Drake, North Carolina State University; Mallory Gyovai, North Carolina State University; M. Nils Petersen, North Carolina State University; Chris Serenari, North Carolina Wildlife Resources Commission; Colleen Olfenbuttel, North Carolina Wildlife Resources Commission; Michael Chamberlain, University of Georgia; Karl V. Miller, University of Georgia

Abstract
Coyote (*Canis latrans*) populations have recently become more prevalent throughout the Southeastern Unites States. While many studies have focused on the effects of this novel predator on white-tailed deer (*Odocoileus virginianus*) populations, few studies have directly measured the relationship between hunters and coyotes. To explore hunter perceptions of coyotes, we administered on-line surveys to hunters in urban areas (n= 1664) and to hunters in rural areas (n=1353) of North Carolina. Our preliminary data suggests the number of days hunted per year, game most hunted, and the respondent's area of residence related to perceptions of coyotes. When annual days hunted increased, hunter perceptions of risk from coyotes increased ($F(1,2536)=20.1$, $p < .001$) and their affectual connection to coyotes decreased ($F(1,2533)=91.9$, $p < .001$). Deer and turkey hunters were more concerned with coyotes reducing game populations where they hunt than either small game or waterfowl hunters ($F(5,2567)=18.0$, $p < .001$). Rural hunters had significantly more knowledge of coyote hunting seasons than urban hunters (?2(2, N=2968) = 73.40, $p < .001$), but urban hunters had a higher belief that coyotes were an important part of nature ($F(1,2850)=109.3$, $p < .001$). These results demonstrate that perceptions of coyotes are not homogenous within the hunting community. These trends should be considered by state and federal agencies when adjusting hunting and trapping regulations to best serve their target subset of hunters. Further research should expand on state-to-state and regional differences in hunter perception of coyotes.

Contact: **maturne6@ncsu.edu**

NOTES:

Poster Session

P-04 *Can Vegetation Characteristics Indicate Habitat Quality for White-tailed Deer (*Odocoileus virginianus*)?

Authors
Donald P. Chance, Mississippi State University; Johannah R. McCollum, Mississippi State University; Marcus A. Lashley, Mississippi State University; Garrett M. Street, Mississippi State University; Bronson Strickland, Mississippi State University

Abstract
White-tailed deer (*Odocoileus virginianus*) managers are often forced to assess habitat quality based on vegetation characteristics because animal use data are frequently unavailable. However, few attempts have been made to determine if trends in white-tailed deer space use and vegetation characteristics provide similar estimates of quality, particularly when interacting with competitors and predators. In this study, we will measure microsite vegetation characteristics such as forage quantity and quality, visual obstruction, and nutritional carrying capacity alongside intensity of use of deer and coyotes (*Canis latrans*). In a systematic sampling grid, vegetation data will be collected at 81 locations in the 550-acre managed loblolly pine system. Additionally, camera traps at the same locations will monitor animal use. Using regression analyses, we will determine the unique variation in deer intensity of use explained by each vegetation characteristic and coyote intensity of use. We expect deer to use areas that maximize the tradeoff between high-quality food resources and cover by using areas that maintain high nutritional carrying capacity and visual obstruction even if those areas are used by coyotes (i.e., deer seek cover rather than avoid coyotes). These data will help refine our ability to assess habitat quality based on vegetation characteristics, which will improve habitat management for deer and other species.

Contact: **dpc144@msstate.edu**

NOTES:

Poster Session

P-05 *Comparison of Seasonal Movements Between Localized Populations of Urban and Rural White-tailed Deer in Southern Indiana

Authors
Garrett B. Clevinger, Ball State University; Jonathan K. Trudeau, Ball State University; Timothy C. Carter, Ball State University

Abstract
In recent years, the movement patterns of urbanized populations of White-tailed deer (*Odocoileus virginianus*) (hereafter WTD) have become a major area of interest to wildlife professionals. Although a handful of studies have focused on movement characteristics of either the urban or rural populations of this species, few if any have ever compared these parameters between both populations on a localized scale. By understanding the extent of seasonal movements between adjacent populations of urban and rural WTD within the same general area, wildlife biologists and other stakeholders gain valuable information in which to basis management decisions for the benefit of both the herd and the impacted citizens. This study was conducted in three counties in southern Indiana: Morgan, Monroe, and Brown. The city of Bloomington, Indiana has a healthy population of urban deer. We free darted WTD from a distance or captured them using dropnets, Clover traps, or suspended net guns. Once immobilized, WTD were then equipped with GPS or VHF collars and monitored using satellite or radio telemetry to obtain location data. From January-July 2015-16 a total of 86 WTD was captured consisting of 45 urban individuals and 41 rural individuals. We used occupancy modeling to determine the probability of observing seasonal excursion events given an excursion was made at some point during the season. Sex, season, and locality were used as covariates of detection. Results suggest that rural WTD were more likely to be observed while on a seasonal excursion than their urban counterparts, however the influence of sex did not seem to affect excursion probability.

Contact: **gbclevinger@bsu.edu**

NOTES:

Poster Session

P-06 *Understanding Mechanisms of Diet Selection in White-tailed Deer

Authors
Jacob Dykes, Mississippi State University; Marcus Lashley, Mississippi State University; Bronson Strickland, Mississippi State University; Steve Demarais, Mississippi State University; Dan Reynolds, Mississippi State University

Abstract
Understanding mechanisms of diet selection is essential to the management of herbivores especially for species that can alter plant communities. Because most studies measure use and fail to account for availability of nutrients in naturally occurring vegetation, our understanding of diet selection is still poor for most herbivores. In a replicated cafeteria-style experiment with 15 cool-season forages, we will monitor diet selection of white-tailed deer (*Odocoileus virginianus*). Forages will be planted and protected by deer-proof fences until established. We will measure biomass and a broad range of nutritional qualities of each forage and then immediately thereafter remove fencing to allow deer access while monitoring use of each forage with camera traps. In a regression framework, we will develop an equation to predict selection based on nutritional qualities of planted forages, and naturally occurring forages in the study area. We will conduct an additional cafeteria-style experiment with the same 15 forages at a different time in succession, and perform a replicated experiment with a single forage with 4 soil amendment treatments (i.e., no amendments, fertilize, lime, fertilize and lime). Because plants mature at different rates, temporal replication of the cafeteria-style experiment will effectively reorganize nutritional qualities of the same forages. Also, the single species experiment will allow us to manipulate nutritional qualities of a single species to control for species-specific traits that contribute to diet selection. Quantifying the availability of nutrients found in naturally occurring deer forages will further our understanding of how nutrient surpluses and deficiencies affect deer diet selection.

Contact: **jld475@msstate.edu**

NOTES:

Poster Session

P-07 Evaluation of Insecticides and Repellents for Suppression of Feeding Injury by Deer in Soybeans

Authors
W. Cory Heaton, Clemson University; Jeremy K. Greene, Clemson University; David Gunter, Clemson University; Jonathan Croft, Clemson Cooperative Extension Service

Abstract
We evaluated the effectiveness of repellents and insecticides at suppressing feeding injury from deer (*Odocoileus virginianus*) on soybeans in Orangeburg, SC. Replicated small-plot trials were conducted in a field with historically high pressure from deer. Base treatments consisted of three different at-plant options that included: aldicarb, phorate, and no at-plant treatment. Base treatments were banded over the row at planting and were evaluated for deterrent effects with and without foliar treatments. Foliar insecticide and repellent treatments were applied weekly for three weeks over each at-plant treatment following emergence of seedlings. A RCBD was used to evaluate the effectiveness of at-plant treatments, foliar treatments, and the interaction of at-plant treatments with foliar applications. Trials were replicated four times. Plots were monitored weekly from emergence for 6 weeks. Damage ratings (0 ?" 5 scale, where '0' indicated no damage, and '5' indicated total loss of foliage) were assigned to each plot weekly. At-plant treatments were statistically different in their ability to deter deer feeding ($P < 0.0001$; ? = 0.1). Mean damage ratings for aldicarb, phorate, and the untreated control were 0.366, 1.270, and 1.131 respectfully. Soybeans with aldicarb as an at-plant treatment received significantly less damage than soybeans with phorate or those left untreated at planting. Minor differences between foliar applications were observed ($P = 0.0689$; ? = 0.1), but Hinder and insecticidal soap provided the highest level of injury suppression. There were no interaction effects between the at-plant treatments and foliar treatments ($P = 0.9605$; ? = 0.1).

Contact: **heaton2@clemson.edu**

NOTES:

Poster Session

P-08 *Proactive Anti-predator Behavior of White-tailed Deer (*Odocoileus virginianus*) During Fawning Season

Authors
Summer D. Higdon, University of Missouri - Columbia; Corinne A. Diggins, Virginia Tech; Michael J. Cherry, Virginia Tech; W. Mark Ford, Virginia Cooperative Fish and Wildlife Unit

Abstract
Coyotes (*Canis latrans*) are a novel predator in the southeastern United States and white-tailed deer (*Odocoileus virginianus*) fawns serve as an important food source in the summer months. To understand how deer have adjusted their behavior in response to this threat, we developed a study to evaluate activity patterns of adult female deer with and without fawns in the presence of coyotes. We conducted our study in the Roan Highlands of western North Carolina during June - August 2015. We randomly placed camera traps at 40 grassy bald and forested sites for approximately 78 days. We determined sex and age for all photos of deer. We plotted coyote activity patterns with activity patterns for does with fawns and does without fawns using the date and time stamp available on all camera trap images. Coyotes were strongly crepuscular and does without fawns overlapped with them the majority of the time (dhat = 0.717). Does with fawns were primarily active during the day, effectively avoiding the times during which coyotes were most active (dhat = 0.385). The presence of fawns created a significant difference in doe activity overlap with coyotes. Few studies demonstrate that coyotes induce behavioral modifications in their prey. We offer evidence that female deer with fawns adjust their activity budgets to avoid interactions with coyotes.

Contact: **sdh5zf@mail.missouri.edu**

NOTES:

Poster Session

P-09 *Does Social Class of White-tailed Deer Influence Use of Supplemental Feeders?

Authors
Onalise R. Hill, Texas A&M University-Kingsville; Justin P. Young, Texas A&M University-Kingsville; Timothy E. Fulbright, Texas A&M University-Kingsville; David G. Hewitt, Texas A&M University-Kingsville; Charles A. DeYoung, Texas A&M University-Kingsville; Don A. Draeger, Comanche Ranch

Abstract
Supplemental feed is a management tool that has been used in many regions of North America to increase white-tailed deer (Odocoileus virginiana) herd health and productivity, but the effect of supplemental feed on social behavior of deer is not well understood. Hierarchal competition within a white-tailed deer herd may compromise effectiveness of supplemental feeding. I hypothesized that peak feeding times of bucks and fawns will be correlated in the enclosures with only one feed site, but not correlated in the enclosure with several available feeding sites. We placed game cameras in 3, 200-acre enclosures with 40 deer/1 feeder, 60 deer/1 feeder, and 60 deer/3 feeders on both the Comanche and Faith ranches in Dimmit County, TX. The cameras actively recorded photos from November 2014 to mid-April 2015, and November 2015 until early April 2016. I analyzed a subset of these photos to determine the probability of observing a mature buck, immature buck, mature doe, immature doe, and fawn at specified time intervals in a 24-hour period. Peak feeding times among social classes were compared. Presence of mature bucks at a single available feeding site may cause less dominant deer to feed at a different time or rely on natural vegetation. Contrary to my hypothesis, preliminary results suggest no difference in the peak feeding times among the social classes in the high density enclosure with one feeder (60 deer/1 feeder).

Contact: **onalise.hill@yahoo.com**

NOTES:

Poster Session

P-10 *Influence of White-tailed Deer on Oak and Hickory Regeneration in Southern Illinois

Authors
Ryan E. Leeson, Southern Illinois University Carbondale; Clayton K. Nielsen, Southern Illinois University Carbondale; Devon C. Oliver, Southern Illinois University Carbondale; Eric J. Holzmueller, Southern Illinois University Carbondale

Abstract
Many oak/hickory-dominated forests in the eastern U.S. are experiencing a lack of oak (Quercus spp.) and hickory (Carya spp.) regeneration. White-tailed deer (Odocoileus virginianus) may contribute to this issue by altering composition of forest stands through browse of seedlings and/or consumption of acorns. In June 2015, we established 150 paired plots (enclosed and control) in southern Illinois to assess deer impacts on regeneration. At each plot, we measured 25 habitat variables to assess impacts of deer herbivory from August 2015 to August 2016. Oak seedlings were present more often and in higher numbers within enclosed plots ($F_{1,299} = 6.25$, $P < 0.050$ and $F_{1,387} = 4.50$, $P < 0.050$, respectively). There were no differences in the height of oak seedlings or the presence, number, or height of hickory seedlings in enclosed versus control plots ($F_{1,53} = 0.010$, $P = 0.938$, $F_{1,299} = 0.850$, $P = 0.357$, $F_{1,267} = 1.16$, $P = 0.282$, and $F_{1,15} = 0.030$, $P = 0.855$, respectively). During September-November 2015, we counted and marked fallen acorns within 50 random paired-plots. The number of acorns discovered or lost did not differ between enclosed and control plots ($F_{1,94} = 0.310$, $P = 0.578$ and $F_{1,8} = 0.120$, $P = 0.736$, respectively). We suggest managers incorporate potential deer impacts when designing management plans to best encourage oak regeneration.

Contact: **ryan.elizabeth.leeson@gmail.com**

NOTES:

Poster Session

P-11 *Comparison of Food Plot Mixtures for Attracting White-tailed Deer

Authors
Ryan E. Leeson, Southern Illinois University Carbondale; Clayton K. Nielsen, Southern Illinois University Carbondale; Devon C. Oliver, Southern Illinois University Carbondale; William J. Banz, Southern Illinois University Carbondale

Abstract
Despite the multitude of food plot mixtures available for white-tailed deer (*Odocoileus virginianus*), few studies have assessed the efficacy of different mixtures at attracting deer in Midwestern landscapes. During September-November 2015, we established 4 no-till food plot mixtures in 16 plots (5445 feet2 in size) in southern Illinois and measured deer use via 2 methods: vegetation growth in exclosures versus control (i.e., unfenced) areas and camera traps. We compared Big Tine Buck Brunch, Evolved Harvest Throw & Gro, Antler King No Sweat, and a food plot mix that we created. Deer used all 4 food plot mixtures (n = 292 ?" 2,522 pictures per plot over 9 weeks), having a negative impact on mean vegetation height outside of exclosures ($F_{3,1148} = 6.71$, $P < 0.001$). Analysis of camera data indicated that deer did not preferentially use any one food plot mixture over the others ($F_{3,12} = 0.090$, $P > 0.050$). There was also no difference in the proportion of deer pictured in the process of eating within each food plot mixture ($F_{3,12} = 0.592$, $P > 0.050$). We suggest any of these 4 food plot varieties could be planted by a hunter or wildlife manager in the Midwest and observe similar use by deer. Further research is planned which will utilize an additional 4 weeks of camera data, where we will further examine the individual behavior and interactions of deer within each unit.

Contact: **ryan.elizabeth.leeson@gmail.com**

NOTES:

Poster Session

P-12 *Female Mate Choice in White-tailed Deer: Does Male Phenotypic Quality Inform Preference?

Authors
Daniel L. Morina, Mississippi State University; Steve Demarais, Mississippi State University; Bronson K. Strickland, Mississippi State University; Jamie E. Larson, Mississippi State University

Abstract :
Male secondary sexual characteristics likely evolved due to sexual selection, but conclusive evidence of female choice in mammals has been difficult to generate due to the need to control for male intrasexual competition and auto correlated male sexual traits. Using white-tailed deer (*Odocoileus virginianus*) as a model species, we manipulated antler size on males while controlling for body size and age and allowed 25 estrus females the opportunity to choose between segregated pairs of males with either large or small antlers. Only trials with >60% cumulative time spent while engaged in walking, bedding, walking+bedding, and behavioral indicators of choice within 10 feet of a male's fence line were included in the sign test. Females chose males with large antlers over small while walking (in 11 of 14 trials, P = 0.029), bedding (in 10 of 11 trials, P = 0.006), walking+bedding (in 12 of 13 trials, P = 0.002), and overall (in 13 of 15 trials, P = 0.004). Behavioral indicators were observed in only 5 trials and were not statistically significant (in 4 of 5 trials, P = 0.1875) and were not included in the overall test. Our results demonstrate that female deer preferentially choose larger over smaller antlered males when intrasexual male competition was controlled. Females choosing to breed with larger antlered males may increase fitness because this moderately to highly heritable trait increases reproductive success in males.

Contact: **dlm688@msstate.edu**

NOTES:

Poster Session

P-13 *Does White-tailed Deer Browsing Result in Browse Lines on Three Preferred South Texas Woody Plants?

Authors
Lindsey M. Phillips, Texas A&M University–Kingsville; Timothy E. Fulbright, Texas A&M University–Kingsville; David G. Hewitt, Texas A&M University–Kingsville; Charles A. DeYoung, Texas A&M University–Kingsville; Don A. Draeger, Comanche Ranch

Abstract
Intense browsing by white-tailed deer (*Odocoileus virginianus*) typically results in a reduced canopy volume of woody plants. In semiarid environments, the effects of intense deer browsing may be less pronounced because woody plants are capable of compensatory growth in response to browsing. Presence of supplemental feed may reduce the effects of increasing deer density on woody plants. Our objectives were to determine if (1) woody plant canopy volume decreases with increasing deer density and (2) if maintaining a ratio of 20 deer/feeder reduces the effect of increasing deer density on canopy volume of spiny hackberry (Celtis ehrenbergiana), blackbrush acacia (Acacia rigidula), and guayacan (Guajacum angustifolium). Matching pairs of each plant species were located in June 2013 and one plant/pair was randomly chosen for an exclosure to eliminate deer browsing. During July 2013- 2016, canopy volume of each plant was estimated by measuring total plant height and diameter at 0.82-ft height increments. There was no effect on guayacan, spiny hackberry < 4.92 ft tall, or blackbrush acacia < 4.92 ft tall ($P > 0.05$). Irrespective of deer or feeder density, there was a decrease in the canopy volume of blackbrush acacia outside of the exclosures compared to inside the exclosures ($P < 0.02$). Spiny hackberry canopy volume increased with increasing deer density with one feeder and with increasing deer and feeder densities together ($P < 0.05$). There is no obvious evidence of 'browse lines.' Spiny hackberry >4.92 ft tall appears to follow the grazing optimization hypothesis by compensating for tissue removed by deer.

Contact: **lmp0004@gmail.com**

NOTES:

Poster Session

P-14 The Culicoides Enigma: Which Biting Midge Species Are Important in HD Epidemiology in the Southeast?

Authors
Mark G. Ruder, Southeastern Cooperative Wildlife Disease Study; Stacey L. Vigil, Southeastern Cooperative Wildlife Disease Study; David E. Stallknecht, Southeastern Cooperative Wildlife Disease Study; David Shaw, Southeastern Cooperative Wildlife Disease Study; Matthew D. Walter, Southeastern Cooperative Wildlife Disease Study; Clara Kienzle, Southeastern Cooperative Wildlife Disease Study; Kayla Garrett, Southeastern Cooperative Wildlife Disease Study; Joseph L. Corn, Southeastern Cooperative Wildlife Disease Study

Abstract
Hemorrhagic disease (HD) of white-tailed deer (WTD; *Odocoileus virginianus*) is caused by epizootic hemorrhagic disease viruses (EHDV) or bluetongue viruses (BTV). Confirmed vectors include C. sonorensis (BTV and EHDV) and C. insignis (BTV only) but in endemic regions of the Southeast, other Culicoides species are suspected vectors. SCWDS is actively engaged in long-term monitoring of both Culicoides populations and HD activity in the Southeast. Collectively, these datasets help to recognize patterns of disease and improve our understanding of HD epidemiology. From 2007-2016, Culicoides were collected August-September using CDC miniature black-light traps at >275 sites throughout nine southeastern states. In addition, HD activity in the same study region was monitored by annual HD reporting by state wildlife management agencies using a questionnaire-based survey, along with diagnostic virology to isolate EHDV and BTV from WTD suspected to have HD. From 2007-2016, HD was reported annually within the study region and >150 viruses (EHDV and BTV) were isolated. Culicoides surveys in the same region over the study period yielded approximately 300,000 Culicoides, representing 44 species. C. insignis, a BTV vector, was commonly collected in Florida but was scarce outside of Florida. C. sonorensis (EHDV/BTV vector) was rarely recovered and was only present in 5% of sites in low numbers. Commonly collected Culicoides spp. over the entire survey area were C. haematopotus, C. stellifer, and C. debilipalpis. Absence of confirmed vectors throughout much of the study area, a region with endemic HD activity, indicates need for targeted studies aimed at incriminating suspect vectors.

Contact: **mgruder@uga.edu**

NOTES:

Poster Session

P-15 *Quantifying the Effects of Coyotes on Vigilance Behavior in White-tailed Deer

Authors
D.S. Steakley, Mississippi State Univerisity; M.A. Lashley, Mississippi State University; M.C. Chitwood, University of Montana; C.S. DePerno, North Carolina State University; C.E. Moorman, North Carolina State University

Abstract
Abstract Predation risk may be perceived differently by the sexes because of differing vulnerability associated with sexual dimorphism in white-tailed deer. However, little attention has been given to how the sexes differ in behavioral adjustments to predation risk. In an ongoing long-term landscape-scale experiment, we are using camera traps to monitor the responses of male and female white-tailed deer to experimental coyote removals in a before-after control-impact design. Each August for 3 years, we quantified male and female vigilance rates at 10 sites with 10 cameras at each site covering 160,000 acres at Fort Bragg Military Installation in North Carolina. In year 4, intensive coyote trapping was implemented over half of the study area including 5 of the camera trapping sites or a total of 50 camera locations. Currently, over 300 coyotes have been removed from the treatment area. During August in the past 2 years, we continued to monitor vigilance of each sex on trapped and control sites which will allow us to quantify vigilance behavioral adjustments of each sex to decreased predation risk from coyotes. Preliminary data indicate that females were 29% more vigilant than males but data following coyote removals have not been analyzed. We hypothesize that vigilance behavior in females will be more sensitive to changes in predation risk because of the overall larger proportion of the female time budget allocated to vigilance. Thus, we expect vigilance levels between males and females to become more similar as predation risk decreases.

Contact: **ds1334@msstate.edu**

NOTES:

Poster Session

P-16 *Spatio-temporal Responses of White-tailed Deer to the Use of Bait During the Hunting Season

Authors
David B. Stone, University of Georgia; Tom Prebyl, University of Georgia; James A. Martin, University of Georgia; Charlie Killmaster, Georgia Department of Natural Resources; Karl V. Miller, University of Georgia

Abstract
Baiting can alter natural movement patterns potentially leading to a change in harvest rates. However, it is unclear if deer are more susceptible to harvest at bait sites than other parts of their home range, which demographic may be more susceptible at bait sites, and how harvest susceptibility changes throughout the season. Therefore, we examined daily utilization distributions (UDs) during legal hunting hours for 35 (23 males, 12 females) adult (?-2.5 years-old) deer instrumented with global positioning system (GPS) collars. We created buffers around each bait site and equally-sized, systematically-sampled points within home ranges during the pre-breeding, breeding, and post-breeding seasons. We summed the portion of the daily UD overlapping each buffer as a measure of harvest susceptibility; hereafter, relative harvest susceptibility (RHS). Overall RHS at non-baited locations (0.034) was 49% greater than at bait sites (RHS = 0.021; $P < 0.001$). Female bait site RHS was 0.038 and was 2.84x greater than male RHS (RHS = 0.013; $P < 0.001$). Additionally, male RHS of bait sites during the pre-breeding season (0.041) was greater than the breeding (RHS = 0.015; $P < 0.001$) and post-breeding (RHS= 0.020; $P < 0.001$) seasons. Female bait site RHS was 0.065 during the pre-breeding season and was greater than breeding (RHS = 0.053; $P=0.011$) and post-breeding (RHS = 0.047; $P < 0.001$) seasons. Our results demonstrate that deer are less susceptible to harvest at bait sites than non-baited portions of the home range, use bait sites more during the pre-breeding season, and females are more susceptible to harvest at bait sites than males.

Contact: **dbstone@uga.edu**

NOTES:

Poster Session

P-17 *Breeding Chronology and Social Interactions Affect White-tailed Deer Vigilance at Bait Sites

Authors
David B. Stone, University of Georgia; Michael J. Cherry, Virginia Tech; Bradley S. Cohen, University of Georgia; James A. Martin, University of Georgia, Charlie Killmaster, Georgia Department of Natural Resources; Karl V. Miller, University of Georgia

Abstract :
Prey species must balance predator avoidance behavior with other essential activities including foraging, breeding, and social interactions. Anti-predator behaviors such as vigilance can impede resource acquisition rates, potentially leading to reduced fitness. However, in addition to predation risk, vigilance levels may also be affected by socio-sexual factors including breeding chronology and social interactions. Therefore, we investigated how time-of-day, distance-to-forest, group size, social interactions (presence of different sex-age class), and breeding chronology (pre-breeding, breeding, post-breeding seasons) affected probability of feeding (hereafter: feeding) for different sex and age-classes (mature males, immature males, adult females, and juveniles) of white-tailed deer at bait sites. We developed a set of candidate models consisting of social, habitat, reproductive, and abiotic factors and combinations of these factors. We then used generalized linear mixed models (GLMMs) to estimate the probability of feeding and used model averaging of competing models for multimodel inference. Each adult sex-age class' feeding was influenced by breeding chronology. Juveniles were more likely to be feeding than adults in all seasons. Feeding increased with group size for all sex-age classes. The presence of a mature male negatively influenced the feeding of immature males and juveniles were more likely to be feeding when an adult female was present. Feeding decreased with increasing distance-to-forest for mature males but not for other sex-age classes. Our results indicate that each sex-age class modulates vigilance levels in response to socio-sexual factors according to the unique pressures placed upon them by their reproductive status and social rank.

Contact: **dbstone@uga.edu**

NOTES:

Poster Session

P-18 *Temporal Resolution of the White-tailed Deer Visual System and Implications for Movement Detection

Authors
Eryn M. Watson, University of Georgia; Bradley S. Cohen, University of Georgia; David A. Osborn, University of Georgia; Michele Barletta, University of Georgia; Kate Myrna, University of Georgia; Krista Mitchell, University of Georgia; Karl V. Miller, University of Georgia

Abstract
The visual system acts as a gateway to an animal's environment, and constrains the resolution at which organisms acquire and process visual information around them. The central nervous system (CNS) does not interpret available information in a continuous stream. Instead, the CNS interprets data in single moments that are microseconds apart, which an animal perceives as continuous. Therefore, the resolution at which temporal information is perceived is different across animal taxa. Using flicker fusion frequency, the frequency at which a flashing light source is perceived as constant, as a measure of the rate of temporal information processed by an organism's visual system, we determined the temporal resolution of white-tailed deer at different light intensities. The temporal resolution of white-tailed deer decreases as luminance levels diminish. Flicker fusion frequency increased significantly at luminance levels similar to those during sunrise/sunset conditions, and leveled as luminance approached daylight conditions. Our results have implications for the evolution of predator-deer interactions, and suggest that temporal resolution for white-tailed deer exceeds human resolution. Collectively, white-tailed deer are strongly adapted as a crepuscular prey species, being temporally and spectrally sensitive to perceive movement during the times they move most.

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Table 1. Southeastern state deer harvest summaries for the 2015-2016 or most recent available season.

State	Land Area (sq. mi)	Deer Habitat		Percent Forested	% Land Area Public Hunting	Harvest		
		(sq. mile)	(% Total)			Male	Female	Total
AL	51,628	46,981	91	69	5	109,000	166,000	275,000
AR	52,609	44,718	85	53	12	104,792	108,118	212,910
DE	1,954	714	36	15	10	6706	7,975	14,681
FL	51,628	29,280	50	45	16	61,492	36,497	97,989
GA	57,800	38,674	67	67	6	142,346	220,503	362,849
KY	40,395	39,654	97	59	9	85,471	70,259	155,730
LA	41,406	26,562	64	52	9.5	87,360	68,640	156,000
MD	9,837	8,766	89	39	4	36,211	44,884	81,095
MO	69,561	63,910	92	31	4	154,326	120,240	274,566
MS	47,296	31,250	66	66	6	109,732	144,514	254,246
NC	48,511	37,149	77	57	6	122,872	108,265	231,137
OK	69,919	37,425	54	19	3	53,327	35,140	88,467
SC	30,207	21,920	73	63	7.5	111,035	83,995	195,030
TN	42,246	25,770	61	49	9	90,291	77,048	167,339
TX	261,914	152,730	58	40	<2	290,590	257,247	574,508
VA	39,589	35,642	90	59	8	118,744	91,846	210,587
WV	24,064	22,972	95	79	9	86,388	56,567	138,493[1]
Avg or Total	940,564	664,117	73.23	50.7	7.4	1,770,683	1,742,622	3,490,627

Table 1. Continued. Page 2

State	Harvest/sq. mi. Deer Habitat	Method of Data Collection[2]	Estimated Pre-season Population	Length of Season (Days)[3] Archery	Black Powder	Firearms	Method of Setting Seasons[4]	% Land Area Open to Dog Hunting
AL	5.9	A,B,C,F	1,300,000	119 (C)	5 (A)	84 (A,C)	A,B	67
AR	4.7	A,C, F, G	1,000,000	175 (C)	12 (C)	50 (C)	A,B	70
DE	9.2	B, F, G	36,000	131 (C)	14 (A,B)	35 (A,B)	A,B,C	0
FL	3.3	E		35-38	14	74-79	A,B	20
GA	10.7	A,C,D,E, F, G	1,270,000	120-141 (C)	93 (A,C)	86 (C)	A,B,C	23
KY	3.9	D,F,G	825,000	136 (C)	3(A), 9(B)	10-16 (C) + 4 Jr	A,B,C	0
LA	5.3	A,B,C	500,000	123(C)	14(A,B)	65	A,B,C	80
MD	9.3	B,C,D,F,G	214,000	97 (C)	3+9 (A), 13 (B)	13 (A), 2 (B),	A,B,C	0
MO	4.0	B,C,D,F,G	1,200,000	112	11	11-23 +4 Jr	A,B	0
MS	8.1	C, E	1,700,000	123 (C)	12 (A)	74	B,C	90
NC	5.2	A,B,C,D,F,G	942,399	16-56	14	18-82	A,B,C	50
OK	2.4	A,C, E, online	500,000	107 (C)	9	16	A,B	0
SC	9.0	A,B,C	730,000	16 (A)	10 (A)	70-140	C	60
TN	6.4	A, mobile /online		110 (C)	70(C)	56(C)	A,B	0
TX	3.8	B,C	3.5-4.7 million [5]	35	14	65-93 (B, C)	A,B	0
VA	5.9	A,B,C,D,F	910,000	42-77	14-36	15-50	A,B	55
WV	6.0	A	640,000	94 (C)	6 (C)	21 (C)	A,B,C	0
Avg. or Total	8.59		12.2 to 16.4 million					30.29

Table 1. Continued, Page 3

State	No. of Hunters	5-Year Trend	Hunting License Fees (Full Season)		Tagging System		
			Resident	Non-Resident	Physical Tag? License Tag? None?	Mandatory? Volunteer? None?	Bonus Tags Available?
AL	197,740	Stable	$26.20	$301.85	Hunter Log	Mandatory	DMAP
AR	212,595	Down	$10.50 − 25	$55 − 350	License Tag	Mandatory	Female/Mgt buck
DE	21,200	Stable	$25	$130	Physical Tag	Mandatory	2 Antlered, Unlimited Antlerless
FL	138,297	Down	$22	$156.50	None	None	Yes
GA	332,434	Stable	$19-$43	$295-$373	License Tag	Mandatory	WMAs
KY	316,756	Up	$55	$260	License Tag/ Hunter Log	Mandatory	Yes
LA	192,200	Stable	$29-50	$300-352	Physical Tag	Mandatory	DMAP
MD	62,000	Stable	$36.50	$130	Physical Tag	Mandatory	Antlered only
MO	508,645	Stable	$17	$225	License Tag	Mandatory	Antlerless only
MS	147,570	Up	$25-$45	$300-$375	None	None	Antlerless, DMAP & FMAP
NC	249,712	Stable	$36	$160	License Tag	Mandatory	Antlerless Only
OK	186,173	Stable	$25	$280	License Tag	Mandatory	DMAP
SC	146,261	Stable	$25	$225	None	None	Yes & DMAP
TN	198,795	Stable	$161	$331	None	Mandatory	Select WMAs
TX	655,006	Stable	$25	$315	License Tag	Mandatory	MLDP tags
VA	211,000	Down	$46-82	$197-259	License Tag	Mandatory	Unlimited on private lands, antlerless only
WV	232,861	Stable	$35	$196	Physical Tag	Mandatory	Yes
Total	4,009,245						

Table 1. Continued. Page 4

State	Mandatory Orange	Crossbows Permitted	Deer Related Accidents						Highway Kill[7]
			Firearms		Stands		Other		
			Injuries	Fatalities	Inj.	Fat.	Inj.	Fat.	
AL	Yes	Yes	2	0	10	2	0	0	28,794 (C)
AR	Yes	Yes	8	1	6	1	0	0	20,100 (C)
DE	Yes	Yes	0	0	0	0	1	0	4,948 (B)
FL	WMAs only	Yes	5	1	0	1	0	0	15,390 (C)
GA	Yes	Yes	19	2	21	0	0	0	50,000 (C)
KY	Yes	Season & Handicap	0	0	3	0	0	1	3,108 (A)
LA	Yes	Yes	3	0	5	0	0	0	11,031 (C)
MD	Yes	Yes	1	0	8	1	0	0	29,716 (C)
MO	Yes	Yes, Firearms	6	0	?	0	0	0	36,770 (C)
MS	Yes	Yes	3	1	7	0	0	0	22,733 (C)
NC	Yes	Yes	5	2	6	1	0	0	61,047 (C)
OK	Yes	Yes	3	0	3	0	0	0	12,605 (C)
SC	WMAs only	Yes	13	2	11	0	0	0	2,278 (A)
TN	Yes	Yes	1	0	7	4	1	0	31,408 (C)
TX	WMAs only	Yes	1	1	3	0	1	1	54,408 (C)
VA	Yes	Yes	12	2	7	0	0	0	51,000 (C)
WV	Yes	Yes	4	0	5	0	6	4	13,992 (A)
Total									449,328

Table 1. Continued, Page 5

	Limits [8]				% Hunting Success[10]			
State	Season	Antlerless	Antlered	Antler Restrictions [9]	Archery	Muzzleloader	Firearms	Avg. Leasing Fees/Acre
AL	3/None[8]	1 per day	3	A (one buck must have 4-points on 1 side), B (one county all bucks must have 3-points on 1 side), C (12 WMAs)	~15	~20	~45	$6-18+
AR	6	3-6	2	A,C	?	?	?	$6-10
DE	None	4+	2	One buck must have a spread ≥15”	?	?	?	?
FL	2/day [8]	1 or 2/day[8]	2/day [8]	A	----------	35% Combined	----------	$10-12
GA	12	10	2	A (One buck must be 4-points on 1 side) B (9 counties are more restricted)	11	2	43	$5-25
KY	None	Varies	1	C (6 WMAs)	----------	34% Combined	----------	$5-40
LA	6	3	2 with a choice on the 3rd	No	19	19	40	$5-30
MD	Varies	3 with 1 bonus in Region B	3 with 1 bonus in Region B	Yes, on part of buck bag limit	38	30 (C)	41	$5-35
MO	Varies	Varies	3; 1 with firearm	Yes, 49 counties	20	-	40	?
MS	8/6	5/3	3	C	41	39	61	?
NC	6[8]	6[8]	2/4 [8]	NA	----------	46% Combined	----------	?
OK	6	Up to 6	2	No	24	17	27	$5-10
SC	11+	6+	5+	C (13 WMAs)	28	27	63	$8−20

TN		Varies	2 statewide	None	?	?	?	$5-10
TX	5	Up to 5	Up to 3	Yes, 117 counties	----------	57% Combined	---------- --	$7-20
VA	6 (east) & 5 (west)	6	3 (east)& 2 (west)	On 2 WMAs + 7 Counties	~34	~40	~51	?
WV	10	Up to 8	Up to 3	6 WMAs	39	11	46	$1-6
Avg.					26.9	22.7	45.7	

Table 1. Continued. Page 6

State	Private Lands Programs: Type[11]	Private Lands Programs: Min. Acreage Requirements	Private Lands Programs: Fee	Private Lands Programs: No. of Cooperators	Trailing wounded deer with dogs legal?	Supplemental feeding legal?	Baiting legal?
AL	A	None	None	119	Yes	Yes	No
AR	A	500	None	720	Yes	Yes	Yes, Private
DE	DDAP SDDAP	None	None	122 260	No	Yes	Yes, Private
FL	A, C	640; 5000	None	1,201; 17	Yes	Yes	Yes, Private
GA	None				Yes	Yes	No-North Zone Yes-South Zone
KY	B	None	None	514	Yes	Yes (except March – May)	Yes, Private
LA	A	40	Yes	703	Yes	Yes	Yes, Private
MD	None				Yes	Yes	Yes, Private Only.
MO	B	5	None	75,000[12]	Yes	Yes (except CWD zone)	No
MS	A,D	Variable	None	494	Yes	Yes	No
NC	A	Regional; 1,000/500	$50	40	Yes	Yes	Yes, Private
OK	A	1,000	$200-400	150	With officer approval	Yes	Yes, Private
SC	A	None	$50	1,575- 3.3 mil ac	Yes	Yes	Yes, Private
TN	None				With officer approval	Yes	No
TX	A,B,C	None	None	8,547 30.4 mil ac.	Most of Texas	Yes	Yes
VA	DCAP DMAP DPOP	None	None	734 782 13	Yes (no weapon)	No (Sept 1 – first Sat in Jan)	No
WV	None				No	Yes[13]	Yes[13]

Table 1. Continued; footnotes. Page 7

[1] Total harvest includes deer of unknown gender.
[2] A−Check Station; B−Mail Survey; C−Jawbone Collection; D−Computer Models; E−Telephone Survey; F− Telecheck;
G− Butchers/Processors, H – Harvest card submitted end of season, I – Voluntary Internet Reporting.
[3] A−Early Season; B−Late Season; C−Full Season.
[4] A−Harvest & Biological; B−Departmental/Commission Regulatory; C−Legislative.
[5] Texas population estimates should not be compared to estimates prior to 2005 due to changed methodology.
[6] Asterisk if estimate includes landowner exempted hunters.
[7] A−Actual number based on reports; B−Estimated road kill; C-State Farm estimate
[8] AL – 3 antlered bucks per season. No season limit on antlerless deer.
FL – A total of two deer may be harvested per day. Both may be antlerless deer during archery season and if taken with antlerless
deer permits. Only one/day may be antlerless during firearms antlerless deer seasons.
MD – Unlimited antlerless archery bag limit in Region B. Statewide antlerless bag limit of 1 buck per weapon (bow, muzzleloader,
firearm). One bonus buck can be taken in Region B after buying bonus stamp and harvesting two antlerless deer.
MO – No daily or annual limit of antlerless deer but number that can be harvested in each county varies.
NC – Up to 2 buck in areas in the western, northwestern, and central deer seasons. Up to 4 bucks in areas in the eastern deer season.
Unlimited bonus antlerless tags are available.
[9] A−Statewide Antler Restrictions; B−County Antler Restrictions; C−Region or Area Antler Restrictions.
[10]Averages do not include combined reports.
[11] A−DMAP; B−Landowner tags; C−Antlered buck tags; D−Fee MAP.
[12] Reflects all private land management cooperators partnering with the Missouri Department of Conservation, not just limited to deer management. This number should not be compared to estimates prior to 2016.
[13] Except for CWD area and public land from September 1 through December 31.
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