

# IT'S WHAT'S FOR DINNER

<u>een</u>

## FEBRUARY 17-19, 2019

42nd Annual Meeting • Hyatt Regency Hotel, Louisville, Kentucky





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# ------ 42ND ANNUAL MEETING ------OF THE SOUTHEAST DEER STUDY GROUP

February 17-19, 2019 • Louisville, Kentucky

**Deer** It's what's for dinner

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The Kentucky Department of Fish and Wildlife Resources welcomes you to the 42<sup>nd</sup> Annual Meeting of the Southeast Deer Study Group in Louisville, Kentucky.

We would like to thank the Tennessee Wildlife Resources Agency who hosted last year's meeting, the Kentucky Fish and Wildlife Foundation, and all of the sponsors for their generous contribution to this years' meeting. See the back cover for a complete listing of all sponsorships.

### —— COMMITTEES ——

#### **MEETING ORGANIZERS**

Gabe Jenkins and Kyle Sams

#### **PAPER/POSTER SELECTION**

Joe McDermott (Chair) John Hast David Yancy Johnathan Fusaro Matt Springer, PhD

#### SESSION MODERATORS

Gabe Jenkins Scott Harp Karen Waldrop, PhD

#### PROGRAM & AGENDA

Joe McDermott (Chair) Adrienne Yancy David Yancy

SECURITY KDFWR Law Enforcement

#### SITE COORDINATION & REGISTRATION

Kyle Sams (Chair) Sharon Sparrow Naomi Wilson Willie Cook

#### HOSPITALITY

Sharon Sparrow (Chair) Will Bowling Zak Danks Cody Rhoden Tony Black John Zimmer Charlie Plush

#### BUCK EXHIBIT

Joe Lacefield (Chair) Dan Crank Scott Ferrell John Akers

#### ADMIN SUPPORT Willie Cook (Chair) Naomi Wilson Kyle Sams

#### DOOR PRIZES

Derek Beard (Chair) Scott Harp Nathan Gregory Tony Black Mike Strunk

#### SPONSOR/VENDOR/ FUNDRAISING

Rachel Crume (Chair) Sharon Sparrow Kyle Sams Gabe Jenkins

#### MEDIA/TECH

Daniel Vichitbandha (Chair) Dave Frederick

#### OTHER

Bryan Cobban Tsali Franklin Eric Van Beek

# - THE SOUTHEAST DEER STUDY GROUP -

The Southeast Deer Study Group meets annually for researchers and managers to share the latest information on the most important wildlife species in North America. 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.

The Annual Southeast Deer Study Group Meeting is hosted with the support of the directors of the Southeastern Association of Fish and Wildlife Agencies and also the directors of Delaware, Maryland, Missouri, and Texas. The first meeting was held as a joint Northeast – Southeast Meeting in Virginia in 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 searchable list of all presentation abstracts from 1977 to present is available at SEDSG.com, as well as a list of the meetings, their locations, and themes.

The Southeast Deer Study Group was formed as a subcommittee of the Forest Game Committee of the Southeastern Section of The Wildlife Society. The Deer Subcommittee was given full committee status in November 1985 at the Southeastern Section of The Wildlife Society's annual business meeting. States participating regularly in the Southeast Deer Study Group include Alabama, Arkansas, Delaware, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, Missouri, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia.

#### **TWS Professional Development**

The 42<sup>nd</sup> Annual Southeast Deer Study Group meeting can be counted as contact hours for Professional Development and 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's website, <u>www.wildlife.org</u>.

#### **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 Annual Meeting of the Southeast Deer Study Group is prohibited without written consent of the author(s). Electronic versions of this and previous proceedings are available at <u>SEDSG.com</u>. Participation of any vendor/ donor/ exhibitor with the Annual Meeting of the Southeast Deer Study Group, the Southeast Section of The Wildlife Society Deer Committee, the host state, or meeting participants.



# 

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 and 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	Concord, NC	The Challenges of Meeting Hunter Expectations
2017	St. Louis, MO	Disease: Science, Politics, and Management
2018	Nashville, TN	Stakeholder-focused, Science-based, and Data-driven: The Gold Standard for the State Deer Management System?
2019	Louisville, KY	Deer, It's What's for Dinner



#### SOUTHEAST DEER STUDY GROUP, THE WILDLIFE SOCIETY, SOUTHEAST SECTION

STATE	NAME	AFFILIATION
	Kip Adams	Quality Deer Management Association
Alabama	Chris Cook	Alabama Division of Wildlife and Freshwater Fisheries
Arkansas	Ralph Meeker Jeremy Brown	Arkansas Game and Fish Commission Arkansas Game and Fish Commission
Delaware	Eric Ness	Delaware Division of Fish and Wildlife
Florida	Cory R. Morea Becky Shuman Steve Shea (Chair)	Florida Fish and Wildlife Conservation Commission Florida Fish and Wildlife Conservation Commission Shea Environmental Services
Georgia	Charlie Killmaster Tina Johannsen Karl Miller	Georgia Department of Natural Resources Georgia Department of Natural Resources University of Georgia
Kentucky	Gabe Jenkins Kyle Sams	Kentucky Department of Fish and Wildlife Resources Kentucky Department of Fish and Wildlife Resources
Louisiana	Johnathan Bordelon Jimmy Ernst	Louisiana Department of Wildlife and Fisheries Louisiana Department of Wildlife and Fisheries
Maryland	Brian Eyler George Timko	Maryland Department of Natural Resources Maryland Department of Natural Resources
Mississippi	William McKinley Steve Demarais	Mississippi Wildlife, Fisheries, and Parks Mississippi State University
Missouri	Kevyn Wiskirchen	Missouri Department of Conservation
North Carolina	David Sawyer Jonathan Shaw	North Carolina Wildlife Resources Commission North Carolina Wildlife Resources Commission
Oklahoma	Jerry Shaw Dallas Barber	Oklahoma Department of Wildlife Conservation Oklahoma Department of Wildlife Conservation
South Carolina	Charles Ruth Jay Cantrell	South Carolina Department of Natural Resources South Carolina Department of Natural Resources
Tennessee	James Kelly Ben Layton Craig Harper	Tennessee Wildlife Resources Agency Tennessee Wildlife Resources Agency University of Tennessee
Texas	Alan Cain Bob Zaiglin	Texas Parks and Wildlife Department Southwest Texas Junior College
Virginia	Matt Knox Nelson Lafon	Virginia Department of Game and Inland Fisheries Virginia Department of Game and Inland Fisheries
West Virginia	Jim Crum	West Virginia Division of Natural Resources



### SOUTHEAST DEER STUDY GROUP AWARDS -

#### CAREER ACHIEVEMENT AWARD

- 1996 Richard F. Harlow
- 1997 Larry Marchington1998 Harry Jacobson
- 1998 Harry Jacobson 1999 David C. Guynn, Jr.
- 2000 Joe Hamilton
- 2000 Joe Hallinton 2002 Robert L. Downing
- 2002 Robert L. Downing
- 2004 Charles DeYoung

- 2005 Kent E. Kammermeyer
- 2006 William E. "Bill" Armstrong
- 2007 Jack Gwynn
- 2009 David E. Samuel
- 2010 Bob K. Carroll
- 2011 Quality Deer Management Association

#### C

**OUTSTANDING STUDENT POSTER PRESENTATION AWARD** 2010 Emily Flinn Mississippi State University 2011 Melissa Miller University of Delaware Brandi Crider Texas A&M University 2012 2013 Jacob Haus University of Delaware Texas A&M University - Kingsville 2014 Blaise Korzekwa 2015 Lindsay D. Roberts Texas A&M University - Kingsville 2016 Lindsey Phillips Texas A&M University - Kingsville Daniel Morina Mississippi State University 2017 2018 Onalise R. Hill Texas A&M University - Kingsville

#### OUTSTANDING STUDENT ORAL PRESENTATION AWARD

Billy C. Lambert, Jr.	Texas Tech University
Jennifer A. Schwartz	University of Georgia
Karen Dasher	University of Georgia
Roel R. Lopez	Texas A&M University
Karen Dasher	University of Georgia
Roel R. Lopez	Texas A&M University
Randy DeYoung	Mississippi State University
Bronson Strickland	Mississippi State University
Randy DeYoung	Mississippi State University
Eric Long	Penn State University
Gino D'Angelo	University of Georgia
Sharon A. Valitzski	University of Georgia
Cory L. Van Gilder	University of Georgia
Michelle Rosen	University of Tennessee
Jeremy Flinn	Mississippi State University
Kamen Campbell	Mississippi State University
Brad Cohen	University of Georgia
Michael Cherry	University of Georgia
Brad Cohen	University of Georgia
Eric Michel	Mississippi State University
Rebecca Shuman	University of Georgia
Jared Beaver	Texas A&M University
Dan Morina	Mississippi State University
	Billy C. Lambert, Jr. Jennifer A. Schwartz Karen Dasher Roel R. Lopez Karen Dasher Roel R. Lopez Randy DeYoung Bronson Strickland Randy DeYoung Eric Long Gino D'Angelo Sharon A. Valitzski Cory L. Van Gilder Michelle Rosen Jeremy Flinn Kamen Campbell Brad Cohen Michael Cherry Brad Cohen Eric Michel Rebecca Shuman Jared Beaver Dan Morina

- 2012 Robert E. Zaiglin
- 2014 Mark O. Bara
- 2015 Larry E. Castle
- 2016 J. Scott Osborne
- 2017 Karl V. Miller
- 2018 Steve Demarais

# - PLENARY SESSION SCHEDULE -

#### **MONDAY, FEBRUARY 18**

#### 8:00 AM - 10:00 AM PLENARY SESSION 1

Moderator: Dr. Karen Waldrop, Kentucky Department of Fish and Wildlife Resources

#### Welcome Kentucky Department of Fish and Wildlife Resources Commissioner Rich Storm Presentation of Colors Kentucky Department of Fish and Wildlife Resources Law Enforcement Honor Guard Welcome to Louisville Go to Louisville Representative

**Introduction** Dr. Karen Waldrop

**Field to Fork: Recruiting and Retaining Food-Motivated Adult Hunters from Nontraditional Backgrounds** Brian N. Clark

Hunt for Food in Wisconsin: A Product of Evaluation and Adaptive Management Emily Iehl

**Regulated Commercial Harvest: Revisiting a Strategy to Aid in the Management of Overabundant Deer** Kurt C. Vercauteren

#### 10:15 AM - 12:00 PM PLENARY SESSION 2

Moderator: Dr. Karen Waldrop, Kentucky Department of Fish and Wildlife Resources

**Chronic Wasting Disease Transmission Studies to Non-Human Primates and Transgenic Mice** Brent Race

**First Evidence of Intracranial and Peroral Transmission of Chronic Wasting Disease (CWD) into Cynomolgus Macaques: a Work in Progress** Stefanie Czub

**The Future of Deer Hunting and Conservation if CWD Crosses the Species Barrier to Humans** Brian P. Murphy

# ORAL PRESENTATION SCHEDULE -----

#### **MONDAY, FEBRUARY 18**

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Moderator: Gabe Jenkins, Kentucky Department of Fish and Wildlife Resources

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William McKinley	
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James Kelly	
Coordinator panel discussion	

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Moderator: Chris Cook, Alabama Division of Wildlife and Freshwater Fisheries

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Charlie Killmaster	
Deer Baiting/ Feeding in South Carolina	
Charles Ruth	
How External Factors Can Affect Deer Management	
Eric Ness	
Limit Reduction in Two of Louisiana's Ten Deer Areas	
Johnathan Bordelon	
North Carolina's Tool for Evaluating Proposed Deer Regulations	
Jonathan Shaw	
The Effects of Statewide Antler Point Regulations on Buck Harvest in Florida	
Becky Shuman	
Trophy Management Requests: The Voice of the People	
Dallas Barber	
Coordinator panel discussion	

#### **TUESDAY, FEBRUARY 19**

#### 8:00 AM - 10:00 AM TECHNICAL SESSION 1

Moderator: Chris Garland, Kentucky Department of Fish and Wildlife Resources

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*Rainer Nichols	
Effects of Thinning Intensity and Prescribed Fire on Percent Cover of	
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*Kent A. Keene	
Landscape Use by Male White-tailed Deer after Brush Management	.27
*Jacob L. Dykes	

\*Student Presenter

Managing Early Successional Plant Communities to Enhance White-tailed Deer Habitat:	
A Comparison of Planting and Natural Revegetation Methods	28
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*Calvin Norman	
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*Jonathan A. Matthews	

#### 10:15 AM - 12:15 PM TECHNICAL SESSION 2

Moderator: Kyle Sams, Kentucky Department of Fish and Wildlife Resources

Risky Business Isn't for Everyone: Buck Personality Dictates Exposure	
to Hunters During the Breeding Season in Mississippi	
*Ashley M. Jones	
Effects of Breeding Chronology on Productivity of Female Deer in Alabama	
*Mark A. Turner	
Can We Avoid the Red Meat Allergy by Prescribing Fire and Reducing Deer Populations?	
*Moriah Boggess	
White-tailed Deer as Sentinels for Exotic Ticks	
*Seth White	
Investigation of a BTV-3 Outbreak in West Virginia and Virginia	
Mark G. Ruder	
Epidemiological Investigation of an Outbreak of EHD in Kentucky	
Gabe Jenkins	

#### 1:45 PM - 2:45 PM MANAGEMENT SESSION 3

Moderator: Dr. Jonathan Shaw, North Carolina Wildlife Resources Commission

Introduction to Hunting (FW 4882): A College Course Designed to	
Recruit, Retain, and/ or Reactivate Hunters	
Ralph Meeker	
Implementing Mandatory Harvest Reporting – Head, Meet Wall	
Chris Cook	
Electronic Game Checking: "The Dream is Free, Biological Data Sold Separately"	
Jim Crum	
Evolution of Mandatory Harvest Reporting in Kentucky	
Gabe Jenkins	
Coordinator panel discussion	

#### 3:00 PM - 5:00 PM TECHNICAL SESSION 3

Moderator: Dr. Matthew Springer, University of Kentucky Department of Forestry

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Jacob M. Haus	
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Mark D. McConnell	

# POSTER PRESENTATION LIST —

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<b>Repeatability of Antler Characteristics in Individual White-tailed Deer</b> <b>Over Time in a Nutritionally Stable Environment</b>
<b>Behavioral Responses of White-tailed Deer to Heat Stress</b>
Survival and Cause-Specific Mortality of White-tailed Deer Fawns in the Northern Georgia Mountains
Influence of Sex and Season on White-tailed Deer Home Range Size and Movement in a Seasonally Flooded System
<b>Testosterone, the MHC, and Breeding Success of Male White-tailed Deer</b>
Pellets or Pictures, Which Would You Prefer to Count? Comparison of Two White-tailed Deer Population Survey Techniques
<b>Analysis of Allelic Variation in the Prion Protein Gene of South Texas White-tailed Deer</b>
Variable Precipitation Causes Permanent Cohort Effects on Antler Size in South Texas Populations of White-tailed Deer
<b>Mowing Perennial Food Plots: Are You Helping or Screwing Up?</b>
<b>Movements of White-tailed Deer and Hunters, and an Evaluation</b> <b>of Hunter Perceptions and Preferences in the North Georgia Mountains</b>
<b>PFAS: Another Acronym for Deer Managers to Understand?</b>
<b>Evaluation of GPS-sized Expandable Radio-collars Designed for Neonatal White-tailed Deer</b> 57 *Zachary G. Wesner
<b>Occupancy and Space-Use of White-tailed Deer in the North Georgia Mountains</b>
Use of Fecal Genotyping and Spatial Capture-Recapture Modeling to Investigate Coyote Abundance in South Carolina

\*Student Presenter



#### Field to Fork: Recruiting and Retaining Food-Motivated Adult Hunters from Nontraditional Backgrounds

#### Author:

Brian N. Clark Kentucky Department of Fish and Wildlife Resources

#### Abstract:

Because of increasing public demand for hunting instruction for adults, and the growth in "locavore" communities-people motivated by interests in local, sustainable, organic and/ or whole foods, Kentucky Department of Fish and Wildlife Resources (KDFWR) created an adult locavore hunter recruitment program in 2010 with the help of Quality Deer Management Association branches and local sportsmen's groups. The program was re-branded as "Field to Fork" in 2014 and additional partners invited to help offer and grow the program. The program initially offered an annual workshop in a single selected metro area of Kentucky, and featured classroom and field instruction on deer hunting and venison care basics. Participant surveys from the first two years indicated that actual hunting experiences with a mentor were important factors for participants in terms of 1) increasing confidence at hunting independently and 2) continued hunting behavior after workshops. Thus, mentored hunting opportunities were built into the workshops thereafter with favorable results. Rates of hunting participation following Field to Fork deer hunting workshops have been impressive—as high as 80% one to two years afterward. Many participants have also recruited family or friends into subsequent workshops or directly into hunting soon after workshops, with program alumni serving as mentors to the new recruits in many cases.

Demand for the program has been strong. Since 2014, KDFWR has offered Field to Fork workshops in multiple population centers and different formats, and broadened the program's scope to include workshops for hunting wild turkeys, squirrels, waterfowl, grouse and doves. The Field to Fork concept and branding has been very well received within the industry and by target audiences, and is currently being used with KDFWR's permission by several other states and partners. This presentation will provide details about Field to Fork and how others can use this brand to forge partnerships and reach new audiences for increased adult hunter participation among nontraditional demographics.

#### Contact:

brian.clark@ky.gov

#### Hunt for Food in Wisconsin: A Product of Evaluation and Adaptive Management

#### Author:

Emily Iehl Wisconsin Department of Natural Resources

#### Abstract:

For decades, the state of Wisconsin has provided quality deer hunting opportunities to some of the highest numbers of hunters in the country--stalking whitetails is part of our identity. However, hunting as a recreation is changing in Wisconsin just the same as it is in every other state in the U.S. The Wisconsin Department of Natural Resources has worked to address the issue of declining hunter numbers from many different angles since the 1990s, from early efforts including implementation of the Learn to Hunt program for youth, first-time buyer's license discounts, and apprentice hunting licenses, to our flagship Hunt for Food program designed for adults interested in learning to hunt. By placing an emphasis on evaluating our programs, we now have an integrated R3 Team within the Bureau of Law Enforcement working to broaden the brand of hunting in Wisconsin.

<u>Contact:</u> emily.iehl@wisconsin.gov

#### **Regulated Commercial Harvest: Revisiting a Strategy to Aid in the Management of Overabundant Deer**

#### Authors:

Kurt C. VerCauteren<sup>1</sup>, Scott E. Hygnstrom<sup>2</sup>, David Drake<sup>3</sup>

<sup>1</sup>USDA-WS, National Wildlife Research Center

<sup>2</sup> University of Wisconsin - Stevens Point

<sup>3</sup> University of Wisconsin - Madison

#### Abstract:

Eight years ago we published a paper in the Wildlife Society Bulletin entitled, "Regulated Commercial Harvest to Manage Overabundant White-Tailed Deer: An Idea to Consider?" Our motivation was that declining numbers of hunters and increasing

An idea to Consider? Our motivation was that deciming numbers of numers and increasing numbers of white-tailed deer (*Odocoileus virginianus*) had reduced our ability to keep deer populations at or below desired densities through recreational sport hunting alone. We suggested that some form of regulated commercial harvest of deer could provide an additional tool to help state wildlife agencies manage overabundant populations. We outlined potential means to govern regulated commercial deer harvest and explained how it is compatible with the North American Model of Wildlife Conservation. We identified several benefits, including reduced overabundant populations of deer; source of healthy, natural, green, locally produced protein; public engagement and appreciation; and others. We also addressed expected concerns associated with the concept, such as privatization of wildlife; overexploitation; food safety; law enforcement; and challenges of changing laws, regulations, and attitudes. Here, we revisit the idea by rehashing and updating our original thoughts based on knowledge and experience gained by professionals dealing with overabundant deer.

#### **Contact:**

kurt.c.vercauteren@aphis.usda.gov

#### Chronic Wasting Disease Transmission Studies to Non-Human Primates and Transgenic Mice

#### Author:

Brent Race NIH, NIAID, Rocky Mountain Laboratories

#### Abstract:

Chronic wasting disease (CWD) is an emerging prion disease which infects cervids including deer, elk and moose. Since first observed in mule deer research facilities from 1967-1979 in Colorado and Wyoming, CWD has now been detected in numerous states and provinces in North America. CWD infection has caused substantial declines in some wild cervid populations and had numerous negative impacts on the farmed cervid industry. Despite the clear, detrimental effects CWD has on cervid populations, it remains uncertain whether CWD poses a direct threat to human health. Understanding the risk CWD may pose to consumers of cervids and/or cervid products is critical. Our laboratory has used non-human primate and transgenic mouse models to test the ability of CWD to cross the cervid-human species barrier. We found that CWD was able to infect squirrel monkeys but unable to infect cynomolgus macaques, a primate that is evolutionarily closer to humans than squirrel monkeys. In addition, we tested whether CWD could infect transgenic mice that expressed high levels of human prion protein (humanized). Following inoculation, 108 humanized mice were observed for disease onset. No mice developed clinical prior disease. Mouse brains were tested for subclinical prion infection using the most sensitive detection assays available, including the RT-QuIC. Our test results showed that humanized mice were highly resistant to CWD infection. These conclusions are consistent with epidemiologic data and research from numerous other laboratories that indicate a significant species barrier exists between cervid CWD and humans.

#### **Contact:**

raceb@niaid.nih.gov

# First Evidence of Intracranial and Peroral Transmission of Chronic Wasting Disease (CWD) into Cynomolgus Macaques: a Work in Progress

#### Authors:

Stefanie Czub<sup>1</sup>, Walter Schulz-Schaeffer<sup>2</sup>, Christiane Stahl-Henning<sup>3</sup>, Michael Beekes<sup>4</sup>, Hermann Schaetzl<sup>5</sup>, Dirk Motzkus<sup>6</sup>

<sup>1</sup>University of Calgary, Faculty of Veterinary Medicine/ Canadian Food Inspection Agency

- <sup>2</sup> Universitätsklinikum des Saarlandes und Medizinische Fakultät der Universität des Saarlandes
- <sup>3</sup> Deutsches Primaten Zentrum/ Goettingen
- <sup>4</sup> Robert-Koch-Institut Berlin
- <sup>5</sup> University of Calgary Faculty of Veterinary Medicine
- <sup>6</sup> Boehringer Ingelheim Veterinary Research Center

#### Abstract:

This is a progress report of a project which started in 2009. 21 cynomolgus macaques were challenged with characterized CWD material from white-tailed deer (WTD), Mule deer (MD) or elk by intracerebral (ic), oral, and skin exposure routes. Additional blood transfusion experiments are intended to assess the secondary contamination risk of human blood product. Challenge materials originated from symptomatic cervids for ic, skin scarification and partially per oral routes (WTD brain). Challenge materials for feeding of muscle derived from preclinical WTD and clinical MD; and from preclinical macaques for blood transfusion experiments. We have confirmed that the CWD challenge material contained at least two different CWD agents as well as CWD prions in muscle-associated nerves.

Here we present a first data set pertaining to a group of animals either challenged ic with steel wires or per orally and sacrificed with incubation times ranging from 4.5 to 7.4 years at post mortem. Three animals displayed the following mild signs of clinical disease: anxiety, apathy, ataxia and/ or tremor. In six animals wasting was observed, four of those had elevated blood glucose levels. All animals have variable signs of prion neuropathology in spinal cords and brains; and by supersensitive IHC reactions are detected in all animals. Amyloid seeding via real-time quaking-induced conversion (RT-QuiC) and PrP<sup>sc</sup> detection via Western Blot further substantiated these findings. Bank vole and transgenic mice bioassays are currently on the way.

At present, a total of 11 animals are sacrificed and read-outs are ongoing. As of December 2018, preclinical incubation of the remaining 10 macaques ranges from 8.1 to 9.7 years post challenge indicative of the species barrier and the challenge route and comparable to an incubation time of about 10 years for scrapie in the same animal model.

#### **Contact:**

stephanie.czub@canada.ca

The Future of Deer Hunting and Conservation if CWD Crosses the Species Barrier to Humans

#### <u>Author:</u>

Brian P. Murphy Quality Deer Management Association

#### Contact: bmurphy@qdma.com



## ORAL PRESENTATIONS: MANAGEMENT SESSION — AND TECHNICAL SESSION ABSTRACTS —

#### MONDAY, FEBRUARY 18 - MANAGEMENT SESSION 1

#### A 25-year View of Virginia's Captive Deer Program: Regulation, Attrition, and Risk Reduction

<u>Author:</u> Nelson Lafon Virginia Division of Game and Inland Fisheries

<u>Contact:</u> nelson.lafon@dgif.virginia.gov

Notes:

#### **Responding to CWD in Texas**

<u>Author:</u> Alan Cain Texas Parks and Wildlife Department

Contact: alan.cain@tpwd.texas.gov

Monitoring Deer Populations in CWD Core Areas Using Thermal Distance Sampling

#### Author:

Kevyn Wiskirchen Missouri Department of Conservation

#### **Contact:**

kevyn.wiskirchen@mdc.mo.gov

#### Notes:

#### CWD – Discovered in February 2018

<u>Author:</u> William McKinley Mississippi Wildlife, Fisheries, and Parks

Contact: williamm@mdwfp.state.ms.us

Risk-based Surveillance for CWD in Tennessee... it worked

<u>Author:</u> James Kelly Tennessee Wildlife Resources Agency

Contact: james.kelly@tn.gov

Notes:

#### MONDAY, FEBRUARY 18 - MANAGEMENT SESSION 2

#### Our Bumpy Road to Baiting Deer

<u>Author:</u> Charlie Killmaster Georgia Department of Natural Resources

<u>Contact:</u> charlie.killmaster@dnr.ga.gov

#### **Deer Baiting/ Feeding in South Carolina**

#### Author:

Charles Ruth South Carolina Department of Natural Resources

Contact: ruthc@dnr.sc.gov

#### Notes:

#### How External Factors Can Affect Deer Management

<u>Author:</u> Eric Ness Delaware Division of Fish and Wildlife

Contact: eric.ness@state.de.us

#### Limit Reduction in Two of Louisiana's Ten Deer Areas

<u>Author:</u> Johnathan Bordelon Louisiana Department of Wildlife and Fisheries

Contact: jbordelon@wlf.la.gov

Notes:

#### North Carolina's Tool for Evaluating Proposed Deer Regulations

<u>Author:</u> Jonathan Shaw North Carolina Wildlife Resources Commission

<u>Contact:</u> jonathan.shaw@ncwildlife.org

#### The Effects of Statewide Antler Point Regulations on Buck Harvest in Florida

#### Author:

Becky Shuman Florida Fish and Wildlife Conservation Commission

#### **Contact:**

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#### Notes:

#### Trophy Management Requests: The Voice of the People

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#### Season of Fire Affects Timing of Deer Use

#### Authors:

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#### Abstract:

Prescribed fire commonly is used to manage white-tailed deer habitat. Fire timing may affect phenology of nutrient availability, which could be important when using fire to target the latesummer stress period or to augment hunting opportunities. However, importance of fire timing on available nutrition and deer habitat use has not been well-studied. In a randomized block design in loblolly pine forests, we established 9 replicates of dormant-season (March) and growing-season (June) fire to determine how fire timing affected phenology of forage quality and deer use relative to unburned plots. We tracked monthly forage quality in 5 forages across sites. Concurrently, we monitored intensity of deer use of each replicate with camera traps. Dormant-season fire yielded a peak in forage quality during May while the peak was in July following growing-season fire. Deer use consistently followed the peaks in forage quality. Thus, for managers interested in providing high-quality forage to deer during early antler growth and late gestation, dormant-season fire timing was best. For those interested in providing high-quality forage to deer during the latesummer stress period, growing-season fire timing was best. Moreover, from a hunting perspective, growing-season fire was used most by deer during the October bow season. For managers interested in maximizing available nutrition to deer throughout the year and maximizing deer use of an area, implementing fires during multiple seasons is necessary. Our data indicates fire timing is an important consideration to deer managers and using fire outside traditional burn windows may better accomplish some objectives.

\*Student Presenter

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#### Effects of Thinning Intensity and Prescribed Fire on Percent Cover of White-tailed Deer Forage Plants in Loblolly Pine Stands

#### Authors:

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#### Abstract:

While it is accepted that thinning and prescribed fire increase and maintain coverage of white-tailed deer (Odocoileus virginianus) forage plants in loblolly pine (Pinus taeda) stands, the relationships among thinning intensity, prescribed fire, and deer forage have not been quantified. Therefore, we employed three thinning treatments (i.e., residual basal areas of 40 [high intensity], 60 [moderate intensity], and 80 [low intensity] ft<sup>7</sup>/ac), with and without prescribed fire, in five loblolly pine stands within Georgia's Piedmont physiographic region. The first growing season post-thinning (2017), we did not detect an effect of thinning intensity on percent cover of deer forage. In early spring 2018, we applied prescribed fire to half of each treatment unit. By the end of the growing season, vine and bramble cover were 54% lower in burned units, but cover of legumes, non-legume forbs, and woody browse did not differ between burned and unburned units. Thinning intensity did not affect percent cover of vines, brambles, or woody browse during the second growing season (2018) after thinning. However, percent cover of legume and non-legume forbs were 41-47% greater in both moderate and high intensity thinning treatments compared to the low intensity thinning treatment. Our results suggest that thinning to 40 or 60 ft<sup>2</sup>/ac instead of 80 ft<sup>2</sup>/ac at the first commercial thin increases percent cover of forbs preferred by deer. However, these results only apply to the first two growing seasons post-thinning, and the first growing season post-fire, and may change in subsequent years as the understory plant community develops.

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#### Landscape Use by Male White-tailed Deer after Brush Management

#### Authors:

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#### Abstract:

Habitat selection by ungulates is influenced by the perceived cost-benefit of resources in terms of forage quality and availability vs. predation risk and cover. Commonly, cervids are faced with the trade-off between quality forage and cover. The effects of such trade-offs become more apparent after large-scale habitat disturbances, like brush management. Brush management is used to increase herbaceous vegetation, manage undesirable plant species, and alter wildlife habitat, but results in spatial variation of resources across the landscape. In summer 2008, root-plowing was implemented in a strip-motte pattern within a 440 ha block of dense re-growth mesquite on a ranch in South Texas. Mottes and brush outside of the root-plowed strips were left undisturbed; post-treatment habitat classes comprised 46% brush strips (~85 m wide), 51% root-plowed strips (~95 m wide), and 3% brush mottes (~0.1-0.4 ha). We evaluated use of mottes, brush, and root-plowed area by 10 GPScollared male white-tailed deer (Odocoileus virginianus) from October 2008 to August 2009. Ivlev's Electivity Index for mottes was 4 times higher than brush, even though mottes comprised only 3% of the study area. Deer selected brush, 46% of study area, but avoided the root-plowed area. This is likely a response to both the cover and vegetation regrowth. Land managers are often presented with the task of balancing objectives and cost when manipulating the landscape. Motte creation is time consuming and make follow-up treatments more difficult, thus understanding landscape use of wildlife species after brush management is an important consideration when developing management regimes.

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#### Managing Early Successional Plant Communities to Enhance White-tailed Deer Habitat: A Comparison of Planting and Natural Revegetation Methods

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#### Abstract:

Early successional plant communities can be an important component of white-tailed deer habitat. However, throughout the Mid-South, old-fields commonly are dominated by tall fescue, reducing habitat quality by lowering forage quality and structure of cover. Conservation programs, such as the Conservation Reserve Program, promote management of early successional communities for various wildlife species. Eradicating nonnative grasses and planting native grasses is required in most programs. We compared deer habitat quality at 15 sites in AL and TN (2017-2018) following tall fescue eradication. Treatments included planting native grasses and forbs per recommendations of state wildlife agencies (PL), natural revegetation from the seedbank (NR), and control (CNTL). Visual obstruction measurements were different < 3.3 ft aboveground (PL=95%, NR=88%, CNTL=82%) and  $\geq$  3.3 ft (PL=51%, NR=37%, CNTL=24%). On average, coverage of planted grasses and forbs in PL was 30%. Available selected forage (lbs/ac) was similar in NR (323) and PL (245), but less in CNTL (130). On average, >95% of available selected forage in PL was from the seedbank and not planted species. Nutritional carrying capacity (NCC; deer days/ac) was similar in NR (89) and PL (69), but lower in CNTL (32) at maintenance-level requirements. For peak lactation, NCC was similar in NR (30) and PL (26) and lowest in CNTL (6). Our results indicate planting is not necessary to improve habitat quality of old-fields for deer.

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Impact of White-tailed Deer (*Odocoileus virginianus*) Herbivory on Upland Hardwood Plant Communities and Oak Regeneration in the Piedmont of South Carolina

#### Authors:

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#### Abstract:

Deer populations have rapidly rebounded in the last 50 years resulting in browse lines and decreased regeneration of overstory tree species. Long-term research into the impact of deer on forests and plant communities in the Southeast is needed. Impacts of deer herbivory 13 years after clearcutting upland hardwood stands in the Clemson Experimental Forest were measured by comparing plant communities inside and outside exclosures. An initial study conducted in 2006, one year after the clearcut, concluded that deer density had no impact on the plant communities. To determine longterm impacts of herbivory, plots were resurveyed 13 years later. Results were analyzed at a 90% confidence level because overstory changes have a cascading effect on the whole ecosystem and the 95% confidence interval did not account for changes found in this study. Survey results determined that there was significantly higher plant species richness outside exclosures compared to inside (p < 0.1). Shannon's diversity index was not statistically different between treatments (p > 0.1). Both treatments had an average of two invasive species. For the most pervasive invasive species, Lonicera *japonica*, regeneration was significantly lower where deer were present (p < 0.1). Significantly higher vine regeneration occurred inside exclosures (p < 0.1). *Quercus spp.*, important for both timber and wildlife, regenerated and recruited into the overstory faster over the course of this study in the presence of deer. Plots outside exclosures had a higher population of overstory Quercus *spp.* and a significantly higher population at the 10cm DBH compared to plots inside enclosures (p < 0.1). White-tailed deer positively impacted plant communities resulting in faster recruitment and regeneration of *Quercus spp.* in upland hardwood stands in the Piedmont of SC.

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#### Influence of Deer Density on Corn and Soybean Yields in Western Kentucky

#### Authors:

\*Jonathan A. Matthews, Matthew T. Springer, John J. Cox University of Kentucky, Department of Forestry

#### Abstract:

In the United States, corn (Zea mays) and soybean (Glycine max) are two of the most abundantly grown crops. White-tailed deer (Odocoileus virginianus) commonly feed on these crops when available, and yield losses are often attributed to their browsing. Recent research has suggested that deer may not have as negative of an impact on crop yields as previously thought. Deer density has been suggested as a predictor of damage within local areas; however, the link between density and crop damage is not well established. Our objectives are to determine the impacts of deer browsing on corn and soybean yields, and investigate if deer density correlates to yield loss in western Kentucky. To estimate the impacts deer have on crop yields, we systematically assigned 1 of 2 treatments (i.e., protected and no protection) to plots in 3 distance classes (32.8 ft, 98.4 ft, and 164.0 ft) from a wooded field edge during the 2017 and 2018 growing seasons. We established and harvested 180/102 plots of corn across 3/2 farms and 156/276 plots of soybeans across 2/5 farms in 2017 and 2018 respectively. Deer density was estimated with the Jacobson et al. (1997) branch-antlered buck method. Yield estimates in 2017 showed no reduction in corn yields, but a 7-8 bu/ac reduction in soybean yields. The 2018 yield results and the potential correlation of deer density will be presented. Project results are meant to inform localized deer management efforts, and identify when damage permits are applicable to corn and soybean producers.

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#### **Risky Business Isn't for Everyone: Buck Personality Dictates Exposure to Hunters During the Breeding Season in Mississippi**

#### Authors:

\*Ashley M. Jones, Stephen Demarais, Bronson K. Strickland, Garret M. Street Mississippi State University, Department of Wildlife, Fisheries, and Aquaculture

#### Abstract:

White-tailed deer (Odocoileus virginianus) must make tradeoffs between incurring risk and accessing resources. Intrinsic factors affecting these decisions are not well studied, but we expect that individuals may perceive and react to their environment differently. To address this, we examined the role of two specific intrinsic factors (age and personality type) on the level of risk white-tailed deer experienced across the breeding season in Mississippi. Bucks aged 2.5 to 6.5 years old were captured in east central Mississippi and fitted with GPS collars (n=36). Home ranges for each animal were constructed based on 15 minute relocations during 3, 2-week long temporal periods spanning the breeding season. Animals were categorized by age and personality type, and hunting intensity within their home ranges over the 3 periods evaluated. Our results indicate that age, personality, and season had no effect on whether or not bucks experienced risk. However, for animals that experienced risk, we found personality to be the most statistically supported factor in determining the level of that risk. The net effect of personality on risk ranged from a difference of 81 hours in the Peak Rut season to 33 hours in the Post Rut season. These differences in risk tolerance suggest that there is not a "one-size-fits-all" approach to tradeoffs between risk and mate searching for mature bucks during the breeding season. Personality appears to inform an animal's decision to "risk it" or not

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#### Effects of Breeding Chronology on Productivity of Female Deer in Alabama

#### Authors:

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<sup>2</sup> Alabama Division of Wildlife and Freshwater Fisheries

#### Abstract:

White-tailed deer (*Odocoileus virginianus*) were restocked throughout portions of the southeastern U.S. during the 20th century. Following restocking, some populations have apparently maintained a breeding chronology similar to their source populations, likely contributing to the variation in breeding dates observed across the region. Because it is unclear whether this restocking legacy has demographic consequences, we analyzed a dataset of 270 yearling (1.5 years old) and 2,116 adult ( $\geq$ 2.5 years old) female deer collected during 1995-2017 in Alabama to examine potential differences in in utero productivity as a function of breeding chronology. For each 30-day increase in average site-specific parturition date, productivity of yearling females decreased by approximately 16% (85% CL=4-25\%). We did not observe a similar relationship for productivity of adult females. The relationship between parturition date and productivity we observed for yearlings may be related to plant phenology. Specifically, on sites with later parturition dates, fawns are born near the end of the growing season when nutritional conditions for deer are suboptimal, and these conditions may negatively affect productivity during their first reproductive cycle. Nonetheless, because variation in reproductive output of large ungulates is primarily driven by young females, managers of late-breeding deer populations should be aware that productivity may be below average.

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#### Can We Avoid the Red Meat Allergy by Prescribing Fire and Reducing Deer Populations?

#### Authors:

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#### Abstract:

The prevalence of red-meat allergy is increasing across the Southeast and should be of concern to anyone who eats red meat. The lone star tick (Amblyomma americanum) is primarily responsible for transmission and infection risk has increased with lone star tick abundance. Both prescribed fire and deer herd reduction have been proposed as tick reduction methods but have not been rigorously evaluated. In two replicated field experiments, we evaluated how tick abundance responded to fire season in loblolly plantation, and deer exclusion with and without dormant season fire in upland hardwoods. Drag transects and passive dry-ice traps were conducted in August and September and captured 2,517 lone star ticks across the two study areas. Without the fire or deer density manipulation, our data indicate a person walking through the woods would encounter 6±2 questing lone star ticks per hundred yards in upland hardwoods and  $3\pm 2$  per hundred yards in loblolly plantation. A stationary person would encounter 1 tick per hour in upland hardwoods and 1 tick per 2 hours in loblolly plantation. Lone star tick abundance increased after dormant season fire (i.e., March) in both systems, but only when deer had access to the burned area. Growing season fire (i.e., June) decreased tick loads in pine plantation and deer exclusion did so in upland hardwoods. Our data indicate that the timing of fire and to a lesser extent, deer density are important considerations in deer management to minimize tick populations and associated red-meat allergy risk.

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#### White-tailed Deer as Sentinels for Exotic Ticks

#### Authors:

\*Seth A. White<sup>1</sup>, Mark G. Ruder<sup>1</sup>, Michael Yabsley<sup>1</sup>, David Shaw<sup>1</sup>, Stacey Vigil<sup>1</sup>, Alec Thompson<sup>1</sup>, Kenna Frierson<sup>1</sup>, Kristen Dominguez<sup>1</sup>, Peach Van Wick<sup>2</sup>, Ernesto Dominguez<sup>2</sup>

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#### Abstract:

The Asian Longhorned tick (Haemaphysalis longicornis) was recently detected in the United States. This tick has a broad host range and is native to East Asia, where it is an important vector of multiple human and animal pathogens. Since its initial discovery in New Jersey during 2017, H. longicornis has been confirmed in seven additional states in the eastern United States on six domestic and eight wildlife species, including white-tailed deer. Archived specimens previously identified as H. leporispalustris, the native rabbit tick, were recently re-examined and determined to be the first detection of *H. longicornis* in the U.S. (a white-tailed deer in 2010). Thus, this tick has been present in North America, hiding in plain sight, for years. White-tailed deer are primary hosts for several species of native ticks and have been used to delineate tick distributions through regional deer surveys. To assess the distribution of H. longicornis, we conducted a regional survey targeting whitetailed deer and other wildlife species. H. longicornis was identified on 13/46 (28%) white-tailed deer from 4 states. Infestations were also detected on X other wildlife species including gray fox (1/3, 1/3)33%), coyote (1/3, 33%), and a red-tailed hawk (1/1, 100%). Although infestation prevalence was high for raccoons, the availability of deer through vehicle strike, fawn rehabilitation, depredation removals, and seasonal hunting suggests they are potentially more efficient sentinels. White-tailed deer may play an important role as hosts for H. longicornis similar to other cervid species in the native and other introduced ranges for this tick.

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#### Investigation of a BTV-3 Outbreak in West Virginia and Virginia

#### Authors:

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#### Abstract:

Hemorrhagic disease of white-tailed deer is caused by multiple serotypes of two closely related viruses, epizootic hemorrhagic disease virus (EHDV) and bluetongue virus (BTV). Historically, outbreaks have been caused by two EHDV serotypes and five BTV serotypes. However, over the past 20 years, numerous exotic serotypes of BTV and EHDV have been documented in the US. A recent example was a 2016 BTV-3 outbreak in West Virginia and Virginia. The outbreak was investigated by Virginia Department of Game and Inland Fisheries, West Virginia Division of Natural Resources, the Southeastern Cooperative Wildlife Disease Study, and the United States Department of Agriculture. We took an integrated approach to investigation, which included investigation of mortalities, post-outbreak serologic surveillance, full genome sequencing of BTV-3 isolates, and experimental infection of fawns. During the outbreak, BTV-3 was isolated from nine of 14 deer tested. Post-outbreak serologic testing of hunter-harvested deer in the outbreak area revealed 9% (33/361) of deer had antibodies against BTV-3. Genetic sequencing of BTV-3 isolates from Virginia and West Virginia indicate a close genetic relationship to previous BTV-3 isolates from Florida, Central America, and the Caribbean. Of eight fawns inoculated with BTV-3, all developed viremia and one died on day five. First detected in Florida in 1999, BTV-3 has been detected in nine central or eastern states and may now be established. As new viruses continue to enter and potentially establish in the U.S., it is important to understand how they may interact with endemic viruses and vectors, and ultimately impact deer.

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#### Epidemiological Investigation of an Outbreak of EHD in Kentucky

#### Authors:

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#### Abstract:

An outbreak of epizootic hemorrhagic disease (EHD) virus serotype 2 (EHDV-2) was responsible for significant mortality of white-tailed deer in Kentucky in the summer and fall of 2017. From July 19 to October 21, a total of 1832 reports were received, representing 4581 cases of sick (20%) or dead (80%) deer. The geographic distribution of the outbreak zone in Kentucky was defined by the Appalachian plateau region where over 90% of cases were reported. Epizootic hemorrhagic disease virus, serotype 2 was isolated from 38 of 43 deer sampled statewide; 24.9% (1141) of reported deer were male, 62.5% (2865) were female, and 5.5% (254) were fawns. Of the 1832 reports received, most (1051, 57.4%) described deer that were found at or near water. The remaining 13.9% (254), 12.8% (234), 11.3% (208), and 4.6% (85) were from woods, fields, roads and yards, respectively. Serological testing during the fall of 2017 demonstrated high prevalence of EHD antibodies in deer harvested at wildlife management areas within the outbreak zone, ranging from 50-83%. Based on radio-telemetry data from 59 collared does within the outbreak zone, a crude mortality rate of 42.5% was calculated. Bone marrow from seven of 12 carcasses (58.3%) tested positive for EHDV via RT-PCR, with a calculated EHD-specific mortality rate of 24.7%. Given the advanced state of decomposition at the time of testing, it is estimated the EHD specific mortality rate could be higher and approach the crude mortality rate, with significant population level impact across parts of the Appalachian region.

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#### TUESDAY, FEBRUARY 19 - MANAGEMENT SESSION 3

#### Introduction to Hunting (FW 4882): A College Course Designed to Recruit, Retain, and/ or Reactivate Hunters

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Notes:

#### Implementing Mandatory Harvest Reporting – Head, Meet Wall

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#### TUESDAY, FEBRUARY 19 - MANAGEMENT SESSION 3

Electronic Game Checking: "The Dream is Free, Biological Data Sold Separately"

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#### Notes:

#### **Evolution of Mandatory Harvest Reporting in Kentucky**

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#### Novice Deer Hunter Workshop and Hunt Program to Create New Hunters in Northern Virginia

#### Authors:

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#### Abstract:

Hunting license sales are declining annually in Virginia. The Recruitment, Retention, and Reactivation movement has identified adults without prior hunting experience as a target audience for recruitment efforts. Motivations for these individuals often revolve around the acquisition of venison rather than trophies or tradition. Many hunter recruitment efforts, such as youth and apprentice licenses, assume that aspiring hunters know an existing hunter to mentor them. However, there are individuals interested in hunting who lack these connections. Many of these aspiring hunters take state mandated hunter education programs expecting to learn how to hunt, but these programs are primarily safety programs with little actual hunting content. The Novice Deer Hunter Workshop and Hunt program was established to train adults how to hunt deer and allow the application of that knowledge during managed hunts. Novices are assigned a volunteer mentor, attend a two-day workshop that includes classroom lessons and outdoor exercises, and hunt with their mentor. To date, we have hosted eight workshops on three properties in 4 years. Herein, I present the history, evolution, and details of the Novice Deer Hunter Workshop and Hunt as a successful recruitment program.

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#### Patterns of Low-Velocity Lead Projectile Fragmentation in White-tailed Deer

#### Authors:

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#### Abstract:

Historically, lead remnants from spent ammunition have introduced considerable health risks to wildlife and humans consuming harvested game. Most research has focused on the effects of highpowered rifle bullets with low-velocity ammunition receiving little attention. We radiographed 43 culled deer that were shot postmortem with 1-of-3 low-velocity bullet treatments to determine fragment number in visceral and muscle tissue, fragment size, and distance traveled by individual fragments as response variables. We found a significant difference in fragmentation patterns between deer that were shot in the shoulder compared to the thoracic cavity, and between those contacting bone and those that did not. Fragments were often retained within the muscle tissue of deer with an overall mean retention rate of  $0.61 \pm 0.04$  (SE). We also found a greater retention rate in those deer receiving shoulder shots  $(0.75 \pm 0.6)$  compared to viscera shots  $(0.55 \pm 0.04)$ . Furthermore, deer shot in the shoulder also had a higher proportion of small fragments present post-shot. Fragments traveled from 5.8 mm to 204.9 mm from the entry wound (geometric mean 37.0; 95% CI [34.4, 40.07]) with muzzleloader and rifled slug fragments traveling further than sabot slug fragments. Our results indicate that both managers and hunters should consider the effects of low-velocity ammunition in discussion of both environmental contamination and human-health considerations of hunters. Both shot placement and ammunition type may be considerations for hunters wishing to limit their potential exposure to lead from harvested venison.

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#### A National Outlook at Deer Harvest and Permitted Hunting Accessories

#### Authors:

Kip P. Adams, Matthew D. Ross, Brian P. Murphy Quality Deer Management Association

#### Abstract:

Harvest statistics are valuable for assessing state and regional deer management programs. Allowable scouting, hunting and recovery methods are also important means for comparing state and regional hunting seasons and hunter opportunities. We surveyed state wildlife agencies and collected harvest data from the 2012 to 2017 seasons. We also collected information on the use of tracking dogs, lighted nocks, expandable broadheads, natural deer urine, electronic calls, trail cameras and drones. In 2017 the antlered buck harvest was six percent above the five-year average. Notables included Michigan hunters shot 4.0 bucks per square mile (PSM), and Texas hunters shot nearly as many bucks as the entire Northeast region combined. The antlerless harvest was nine percent below the five-year average, and has declined nearly 20 percent since 2007. Two highlights were Maryland hunters shot 5.7 antlerless deer PSM, and Delaware hunters shot two antlerless deer for each antlered buck. Tracking dogs may be used in 35 states, and 25 of those require the dog to be leashed in at least some situations. Lighted nocks and expandable broadheads are each allowed in 46 states, deer urine may be used in 41 states, electronic deer calls may be used in 13 states, non-texting trail cameras may be used in 41 states, while texting cameras are only allowed in 39 states, and drones may be used for scouting in 16 states. The range of allowable hunting techniques and accessories reflects the diversity in hunter and wildlife agency culture and tradition.

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#### **Culling Bucks for Genetic Improvement: Fact or Fallacy?**

#### Authors:

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#### Abstract:

In the fall of 2006 Comanche Ranch initiated the most aggressive selective harvest program ever imposed upon a wild population of white-tailed deer. We established 3 treatments to study the microevolutionary response to culling for antler traits: 1) intensive (3,500 ac), antlered males of all age classes were culled; 2) moderate (18,000 ac), males  $\geq$ 3 years old were culled; and 3) control (5,000 ac), no culling. Each autumn during 2006–2016, we captured male deer, estimated age, and measured antler characteristics. Males that did not meet antler criteria were sacrificed during 2006-2012. We recorded 5,488 captures of 2,937 individual males, and sacrificed 1,333. We used genetic parentage to estimate breeding values and quantified heritability of antler points and B&C Score. Heritability of antler points and B&C score for 1- and 2-year-old males was low, and not statistically different from 0, whereas heritability estimates for antler points and B&C score for males  $\geq$ 3 years old were low to moderate. Most offspring were sired by males that exceeded the culling criteria, yet culling intensities remained high in both treatments. It appears selective harvest of males is inefficient for changing genetic potential for antler size in wild populations of white-tailed deer.

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#### Individual Heterogeneity in Habitat Use Has Implications for Mortality Risk in Adult White-tailed Deer

#### Authors:

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#### Abstract:

Individuals vary in their use of habitats as a function of sex, age, and experience. Such individual heterogeneity is important for decomposing segments of the population that may or may not respond to habitat or population management, or when targeting management that has greater potential for increasing demographic responses (e.g., survival). We examined individual heterogeneity in habitat selection during the hunting season using multilevel step selection models for 69 adult white-tailed deer of both sexes. We used fractal analysis to determine the scale at which animals perceived and responded to the landscape, and modeled selection using covariates for use of row crop, wetlands, edge, forest interior, and distance to road. We tested for differences in individual-specific habitat selection between age classes and modeled survival as a function of individual-specific selection using proportional hazard modeling. At the population level, males selected for row crop and forest interior and avoided roads, while adult females selected for row crop. Individual-specific selection of forest interior differed between age classes in males, with mature males selecting interior forest less frequently than immature males. Risk was negatively correlated to individual-specific selection for wetland areas in males and forest interior for females. No habitat variables that were selected for or avoided at the population level influenced mortality risk at the individual level, suggesting management efforts based on traditional population level analysis may be misguided. Managers attempting to influence population dynamics via habitat and harvest management should be aware of the substantial heterogeneity in habitat use among individual animals before implementing costly practices that may not be appropriate for their objectives.

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#### The Contribution of Deer Management Cooperatives to Wildlife Conservation

#### Authors:

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#### Abstract:

Engaging private landowners to achieve landscape-level conservation is widely practiced; however, established mechanisms to encourage voluntary conservation practices are lacking. White-tailed deer (Odocoileus virginianus) management is an increasingly popular conservation tool. Deer management cooperatives (DMCs) represent a novel approach to engage private landowners and hunters to improve deer herd and hunting quality for broader conservation use. DMCs are 'a group of landowners and hunters voluntarily working together to improve the quality of wildlife (whitetailed deer), habitat, and hunting experiences on their collective acreage'. We evaluated 45 DMCs across five U.S. states: Georgia, Michigan, Missouri, New York, and Texas and compared DMC landcover to the surrounding landscape. We report higher amounts of multiple 'wildlife centric' land cover types in DMCs across states, and lower amounts of 'agriculturally centric' land cover in three of four states. Land cover differences illustrate DMC benefits to broader landscape conservation. We also surveyed 2,800 members in 45 DMCs across five U.S. states to improve our understanding of member attributes and motivations. We applied Importance-Satisfaction Analysis (ISA) methodology to better understand members' satisfaction with their DMC by evaluating differences in importance and satisfaction for 22 DMC attributes across four types of DMC members with divergent membership motivations. No previous DMC literature has employed an ISA framework to determine discrepancies in perceived DMC member satisfaction. Therefore, we explore the utility of ISA identifying critical attributes for resource managers that influence DMC member satisfaction.

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#### **Conjoined White-tailed Deer Fawns**

#### Authors:

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#### Abstract:

In May 2016 conjoined white-tailed deer (Odocoileus virginianus) fawns were found deceased in southeastern Minnesota. The bodies of the fawns were joined ventrally and laterally with two separate necks and heads. This was the first case described of conjoined, two-headed white-tailed deer brought to full-term gestation and delivered. We conducted a detailed necropsy and 3D computed tomography and magnetic resonance imaging. External body parts appeared symmetrical and normal except for bifurcation of the neck. The pelage was typical of neonatal white-tailed deer with spot patterning, which continued through both necks and heads. Given the timing, morphology, and evidence at the site of collection, we believe the fawns were carried full-term but delivered stillborn. Examination via 3D computed tomography and magnetic resonance imaging indicated duplication of skull, cervical vertebrae, several ribs, most thoracic vertebrae, and the first sternebrae. Caudal to the region of the ninth thoracic vertebra a single vertebral column was evident. No other major skeletal anomalies were noted. The gastrointestinal (GI) tracts were separate. The right GI tract was complete, the left GI tract consisted of two noncontinuous segments. The liver was malformed and shared. Four segments of splenic tissue were present. Two separate hearts shared a pericardial sac. Causes of conjoined twins are speculative, but they likely occur via fusion of two embryonic discs or incomplete splitting of the embryo of monozygotic twins.

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#### Repeatability of Antler Characteristics in Individual White-tailed Deer Over Time in a Nutritionally Stable Environment

#### **Authors:**

\* Nicholas J. Deig, Stephen S. Ditchkoff, William D. Gulsby Auburn University

#### Abstract:

Managers have long been interested in annual variation in antler characteristics of individual whitetailed deer (Odocoileus virginianus). Although an individual's antler size increases with age, annual variation in antler size and conformation has also been associated with annual changes in diet quality, but none have examined the repeatability (i.e., the intra-class correlation of reproducible measurements of a phenotypic trait over time) of antler characteristics in a nutritionally stable environment. Thus, we evaluated the repeatability of antler characteristics in a population of whitetailed deer residing within a 258-ha high-fence facility near Union Springs, AL. We supplemented natural forage with a high-protein, pelletized feed, supplied *ad libitum* year-round, and irrigated forage plots. We located shed antlers annually from 2013-2018 using both systematic and opportunistic searches. We then quantified antler characteristics; including specific gravity, mass (g), total points, and measurements used by the Boone and Crockett scoring system. To identify antlers from the same individual across multiple years, we analyzed 18 microsatellite loci from DNA samples obtained from 184 shed antlers, resulting in 54 unique individuals with shed antlers present in multiple years. Overall, repeatability estimates for antler characteristics were variable, ranging from moderately low for traits like specific gravity (R=0.285) and total points (R=0.304), to high for circumference measurements (R=0.724-0.795), tine lengths (R=0.637-0.735), main beam length (R=0.705), and gross score (R=0.690). Our results suggest that, while males exhibit greater annual phenotypic plasticity in some antler traits, those used for Boone and Crockett scoring remain relatively constant.

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#### Behavioral Responses of White-tailed Deer to Heat Stress

#### Authors:

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#### Abstract:

Heat stress is a common threat to the homeostasis of endotherms. Behavioral adaptations to alleviate heat stress, like seeking shade, wind, or altering activity patterns, are often less costly than physiological changes but may cause competition for thermal cover. Need for thermal cover may differ by sex, age class, or physiological status. For instance, peak lactation in most species of large mammals typically occurs during the hottest months. Thus, females are forced to forage and process foods during the heat to meet their nutritional requirements. The goals of this study are to evaluate behavioral adaptations of white-tailed deer (Odocoileus virginianus) to heat stress and assess competition for thermal cover with cattle (Bos spp.). We will deploy 40 GPS collars (30 deer, 10 cows) equipped with black-globe thermometers across the East Foundation's El Sauz Ranch in South Texas. Collars will record location and operative temperature at 30-minute intervals. We will also deploy black-globe thermometers across the landscape to monitor fluctuations of operative temperature with variation in herbaceous and woody cover and orientation relative to wind. Temperature and GPS data will be analyzed using resource selection functions and remote sensing will be used to identify important habitat characteristics. Knowledge of deer movements, resource selection, and competition for thermal cover will further our understanding of how heat affects deer and cattle and what landscape features mitigate this stress. The results of this study will enable managers to design habitat management regimes that may assist in mitigating the effects of heat stress on deer.

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#### Survival and Cause-Specific Mortality of White-tailed Deer Fawns in the Northern Georgia Mountains

#### **Authors:**

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#### Abstract:

White-tailed deer (Odocoileus virginianus) populations have declined over the past few decades throughout the Chattahoochee National Forest in the southern Appalachians of northern Georgia. From 1979-2015, deer harvests on wildlife management areas (WMAs) declined by 85% and 97% for males and females, respectively. However, nutritional condition indicators (e.g., body mass, yearling antler size) of harvested deer steadily improved during this same time period, suggesting fawn recruitment as a likely cause of population declines rather than habitat-related declines in fecundity. The area is characterized by closed-canopy forests with suppressed understories, possibly lacking adequate escape cover for neonates. Populations of black bears (Ursus americanus), coyotes (Canis latrans), and bobcats (Lynx rufus) have expanded in this region and are known to impact fawn survival possibly causing negative effects on long-term deer population stability. Our objectives were to estimate survival and cause-specific mortality rates of neonatal deer on Blue Ridge and Cooper's Creek WMAs. During 2018, we captured 13 neonates, both opportunistically and with the aid of vaginal implant transmitters, and fitted them with VHF collars. We monitored neonates until 16 weeks of age observing a survival rate of 23%. Of the 10 mortalities, 8 (80%) were attributed to predation, 1 (10%) to abandonment, and 1 (10%) to human causes based on field evidence. Further confirmation of predation is pending analysis of saliva DNA. We will continue to capture and monitor additional neonates through 2020, while also examining the effects of habitatrelated covariates on neonate survival to aid future population management in the region.

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#### Influence of Sex and Season on White-tailed Deer Home Range Size and Movement in a Seasonally Flooded System

#### Authors:

\* W. Hunter Ellsworth<sup>1</sup>, Richard B. Chandler<sup>2</sup>, Mike L. Conner<sup>3</sup>, Karl V. Miller<sup>2</sup>, Elina P. Garrison<sup>4</sup>, Michael J. Cherry<sup>1</sup>

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#### Abstract:

White-tailed deer home range size and movement is influenced by numerous factors, including climate, forage quality, predation risk, and population density. However, white-tailed deer in the Big Cypress Basin of south Florida face unique abiotic factors different from white-tailed deer in other parts of their range. The Big Cypress Basin is a seasonally flooded ecosystem, with distinct wet and dry seasons. This population also has a diffuse breeding chronology more similar to ungulates in semi-tropical environments, with longer breeding and fawning seasons. This unique combination of breeding chronology and hydrology has a marked effect on how white-tailed deer interact with their landscape. Using dynamic Brownian bridge movement models, we evaluated home range size and movement rates as a function of sex and season. Both sex and season influenced home range size and movement rates for white-tailed deer in this system. We also found changes in mean elevational use across home ranges by sex and season. With current concerns over white-tailed deer management in the Big Cypress Basin, it is critical to understand how this distinctive landscape affects white-tailed deer movement and seasonal home range size selection.

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#### Testosterone, the MHC, and Breeding Success of Male White-tailed Deer

#### Authors:

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#### Abstract:

For male white-tailed deer (Odocoileus virginianus), there are many physiological costs associated with the period immediately prior to and during the breeding season, many of which are associated with androgenic hormones. Greater concentrations of androgens, such as testosterone, enhance aggressive breeding behaviors and secondary sexual characteristics (e.g., antler and body size). However, increased androgen concentrations can also impose an immunological burden and increase the risk of injury or death. These handicaps may be mitigated or overcome by genes that confer a more robust immune system, such as the major-histocompatibility complex (MHC) region of the genome. Proteins encoded by MHC genes aid in pathogen recognition and defense, and heterozygosity in this region is associated with decreased parasite load. This study aims to elucidate the role of testosterone in reproductive fitness through its relationship with secondary sexual characteristics and MHC heterozygosity. From 2007 to 2017, we annually sampled blood serum, genetic, and morphological data from a semi-wild population of approximately 100 white-tailed deer residing within a 174-ha high-fence facility north of Auburn, AL. We anticipate that males with greater levels of testosterone should exhibit enhanced traits favored under sexual selection, thereby leading to greater reproductive success. We also anticipate a positive relationship between MHC heterozygosity and greater testosterone concentrations. This study presents a unique opportunity to address these interrelated concepts in a semi-wild population, improving our understanding of the coping mechanisms by which individuals overcome the handicaps associated with breeding, and the relationship among serum testosterone concentrations, sexual selection, and reproductive fitness.

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#### Pellets or Pictures, Which Would You Prefer to Count? Comparison of Two White-tailed Deer Population Survey Techniques

#### Authors:

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#### Abstract:

The ability to accurately measure white-tailed deer (Odocoileus virginianus) population density is a valuable tool for wildlife managers; however, generating accurate estimates can be challenging. Due to varying habitat quality, quantity, and other external factors, population densities can vary drastically between locations. This presents a challenge for making localized management decisions based on landscape level estimates, so effective and efficient localized population estimates are required to make decisions. Additionally, many common estimation techniques (i.e., helicopter surveys, FLIR surveys) are expensive to conduct or complicated to perform/analyze, thus may not be an option. Trail camera surveys of wildlife populations can provide cost-effective estimates with less complex analysis. Furthermore, trail cameras can be used in areas where other methods may be unavailable (i.e., urban environments). We tested the reliability of a trail camera population estimate method by comparing it to a statistically robust distance sampling method. We used the Jacobson et al. (1997) trail camera method for estimating white-tailed deer populations on 10 farms in western Kentucky during the summers of 2017 and 2018. Concurrent with the trail camera surveys, we performed a pellet based distance sampling method on all farms. Trail camera surveys were analyzed following Jacobson et al. (1997) while distance sampling results were analyzed using Program Distance 7.1. Results from this comparison will provide managers a comparison of accuracy for obtaining a localized population estimate. This will help managers choose a population estimation technique that best fits their needs and resources, and aids in management of localized wildlife populations.

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#### Analysis of Allelic Variation in the Prion Protein Gene of South Texas White-tailed Deer

#### Authors:

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<sup>4</sup>Department of Natural Resource Ecology and Management, Iowa State University

#### Abstract:

Chronic Wasting Disease (CWD) is a fatal neurodegenerative disease, classified as a transmissible spongiform encephalopathy. Spread by infectious prion proteins, CWD has become a major management concern for North American cervids. Currently there is no cure or resistance to CWD, but some cervids have genetic mutations that can affect susceptibility and incubation time of the disease. In white-tailed deer (Odocoileus virginianus), mutations at codon 96 of the Prion Protein gene (Prnp) confer partial resistance and delay the progression of CWD. However, this period of latency also makes detection of CWD more difficult. Furthermore, infected deer may live longer but continue to spread the misfolded prion proteins. The main objective of this study is to determine the occurrence of mutations within codons of the Prnp gene in white-tailed deer throughout South Texas. We amplified and sequenced the Prnp gene from tissue samples collected at 5 ranches throughout the South Texas region. Our preliminary results revealed 9 synonymous and 2 non-synonymous mutations, with unknown significance, not previously reported in cervids. Twenty-seven of 30 (90%) white-tailed deer had nucleotide substitutions at codon 96 that result in substitution of the amino acid Glycine with Serine, 15 homozygotes and 12 heterozygotes. The frequency of individuals with at least one copy of Serine at codon 96 is up to 4 times higher than previously found in white-tailed deer populations. By understanding which Prnp alleles are present in southern deer populations, we can determine the susceptibility and detectability of the disease for informed management decisions.

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#### Variable Precipitation Causes Permanent Cohort Effects on Antler Size in South Texas Populations of White-tailed Deer

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#### Abstract:

Antler size is considered an indicator of good genes. However, environmental factors also influence antler characteristics. For instance, the effect of precipitation on current-year antler growth is well-known. Conditions during early life also may lead to permanent effects on antler growth. As part of a long-term study of culling on the Comanche Ranch in South Texas, we evaluated the influence of early life conditions on antler growth later in life in a wild population of white-tailed deer (*Odocoileus virginianus*). Each autumn during 2006–2016, we captured male deer, estimated age, and measured antler characteristics. We evaluated cohort effects on antler growth. We recorded 5,488 captures of 2,937 individual males. Precipitation during the 1st year of life had a small but statistically significant effect (0.01-0.07 antler points per inch of precipitation) on antler points for bucks 1.5-4.5 years old, and a larger influence on the Boone and Crockett score (GBC) for bucks  $\geq$  5.5 years old (0.529-0.770 GBC per inch of precipitation). In arid South Texas, where precipitation is highly variable, conditions early in life may have permanent effects on antler growth. The results of this study will have important implications for managers.

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#### Mowing Perennial Food Plots: Are You Helping or Screwing Up?

#### Authors:

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#### Abstract:

Mowing perennial food plots regularly throughout the growing season is commonly recommended to increase nutritional quality and attractiveness for white-tailed deer. We collected biomass (lbs/ ac), nutritional (percent crude protein [CP], phosphorus [P], and calcium [Ca]), and digestibility data (percent acid detergent fiber [ADF]) on ladino clover (2015), alfalfa (2018), and red clover (2018) to determine effects of mowing. On average, mowing reduced biomass of ladino clover by 39%, alfalfa by 30%, and red clover by 48%. Mowing did not affect the nutritional quality of the three forages, though CP and P were slightly greater numerically 1 – 3 weeks after mowing in the young plant material of red clover and alfalfa. Mowing did not affect ADF among any of the forages. Nutritional quality of young plant material of all three forages, mowed or not mowed, approached or exceeded the maximum requirement of a doe with fawns. Our data suggest mowing ladino clover, red clover, and alfalfa food plots throughout the growing season provides little, if any, benefit with regard to nutritional quality or digestibility for deer. We recommend mowing perennial forages once in late summer and perhaps as necessary during the growing season to reduce weed competition, but presence of some weeds complement planted forages by providing additional nutrition and structure that can make the plot more attractive to deer.

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#### Movements of White-tailed Deer and Hunters, and an Evaluation of Hunter Perceptions and Preferences in the North Georgia Mountains

#### Authors:

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#### Abstract:

White-tailed deer (Odocoileus virginianus) populations and hunter numbers in the North Georgia Mountains have experienced drastic declines in recent decades. Information related to the effects of space use by hunters on deer movements is needed to evaluate the harvest vulnerability of deer and the impacts of potential management decisions. Additionally, understanding sources of hunter satisfaction and their motivations to hunt may elucidate the causes of recent declines in hunter numbers. This 2-year study on North Georgia Wildlife Management Areas (WMAs) will have three distinct parts. The first part involves fine-scale deer movements during pre-hunt, hunt, and posthunt periods on WMAs. During Fall 2018, we obtained data from 11 GPS-collared does during two firearms hunts. Additional deer will be collared in early 2019 and will be monitored through Fall 2019. The second part is an analysis of hunter movements (via GPS units) relative to access points, habitats, and other characteristics of WMAs. In 2018 we recruited 40 hunters, providing approximately 100 track logs (hunt days); we will continue during Fall 2019. The last part involves mail-based surveys of deer hunters who have utilized 8 WMAs in North Georgia to understand their satisfaction, motivations, and preferences for hunting on these WMAs. Surveys will be mailed in January 2019 with the goal of receiving 50 responses per WMA. These pieces of information will aid managers in adjusting management to improve the experiences of hunters on WMAs while potentially minimizing negative effects on the declining deer populations.

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#### PFAS: Another Acronym for Deer Managers to Understand?

#### Authors:

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#### Abstract:

Per and polyfluoroalkyl substances (PFAS) are man-made chemicals that have been found throughout the world. In humans, there is evidence that PFAS bioaccumulate and may increase cholesterol levels, change immune response, increase the chance of thyroid disease, and increase the chance of developing certain cancers. As of October 2018, thirty-four PFAS contaminated sites have been identified in Michigan. Testing was recently conducted for deer taken from within 5 miles from four known PFAS contamination sites with elevated PFAS levels in surface water (Alpena, Crawford, Oscoda, and Kent). Sharpshooters removed 20 deer from each of the contamination sites between April and August in 2018 and submitted for testing (muscle, kidney, and liver). Additionally, 48 deer were randomly tested from around the state. PFAS was detected in muscle from three deer from Oscoda County surrounding Clark's Marsh, south of Wurtsmith Air Force Base, as well as two deer from Ingham County. One of the deer from Oscoda County had muscle PFAS levels (547 ppb) exceeding the threshold (300 ppb) for consumption, which led to a Do Not Eat Advisory issued by the Michigan Department of Health and Human Services and Department of Natural Resources surrounding a 5 mile radius around the contaminated site. In addition to the muscle tissue finding, liver and kidney samples also showed evidence of exposure from PFAS throughout the state. We believe this is the first instance of a venison consumption advisory taking place directly due to PFAS contamination levels. The actions in Michigan will likely serve as a template for other states who investigate PFAS contamination in the future.

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#### Evaluation of GPS-sized Expandable Radio-collars Designed for Neonatal White-tailed Deer

#### Authors:

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#### Abstract:

Integration of GPS technology with expandable collar designs would allow researchers to more efficiently investigate survival and movements of neonatal white-tailed deer (Odocoileus virginianus). Testing of collars in controlled settings is warranted before extensive deployment in the field. During summer 2018, we tested the fit and function of 3 designs of GPS-sized collar mock-ups on newborn fawns at Whitehall Deer Research Facility in Athens, GA. We fitted 26 fawns with ear tags and collars (20 Vectronic Vertex, 3 Telonics TGW, 3 Telonics Recon) and ear-tagged 5 control fawns without collars. Additionally, we conducted observations of fawns to evaluate the potential effects of collars on behavior. The folds of all 6 Telonics mock-ups expanded prematurely by  $75.8 \pm 27.9$  days, resulting in extremely loose collars. Once expansion occurred, fawns were able to step through collars with their forelimbs, resulting in collars positioned around the chest or waist. In one example, displacement led to a collar drop at just 80 days. To date, no Vectronic Vertex mock-up collars have dropped or exhibited premature expansion on fawns  $\leq 6$  months of age. Notable effects of collars on fawn behavior included high-stepping during locomotion and erratic jumping. Our results suggest that the GPS-sized expandable collars tested in this study would benefit from modification before being deployed in the field. We recommend additional modifications to each design, such as improved stitching patterns and threads, use of materials that facilitate a more gradual elastic expansion, and decreasing the size of the battery housing and improving weight distribution.

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#### Occupancy and Space-Use of White-tailed Deer in the North Georgia Mountains

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#### Abstract:

White-tailed deer (Odocoileus virginianus) densities on 8 Wildlife Management Areas (WMAs) on Chattahoochee National Forest in the mountains of North Georgia have declined substantially during the past several decades. Georgia Department of Natural Resources restricted harvest of antlerless deer, but populations failed to recover. Timber harvests on National Forests were reduced to historically low levels beginning in the early 2000's, resulting in homogenous conditions of mature, closed-canopy forests. Although health indices of yearling bucks increased, similar data are lacking for female deer. Acorn (Quercus spp.) mast production is an important seasonal resource for deer, black bears (Ursus americanus), and feral pigs (Sus scrofa). Populations of black bears and feral pigs have increased which could influence the ability of deer to procure resources (e.g., mast). We are GPS-collaring adult female deer to investigate their space-use on Blue Ridge and Cooper's Creek WMAs in the North Georgia mountains. In 2018, we captured 12 does and intend to capture a total of 90 does for our 3-year study. To evaluate occupancy of deer relative to other species (e.g., feral pigs, bears) and the availability of mast, we will use grids of 64 passive infrared cameras. Early data suggest that mid-story evergreen species are an important cover type for deer in this system. We will map the distribution of these species to augment NLCD data and examine their use by deer. Results of this study will improve understanding of deer space use relative to current habitat conditions and interactions of deer with other species utilizing similar resources.

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# Use of Fecal Genotyping and Spatial Capture-Recapture Modeling to Investigate Coyote Abundance in South Carolina

#### Authors:

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#### Abstract:

Coyotes (*Canis latrans*) have expanded eastward across North America during the last century, becoming ubiquitous on the landscape of the southeastern United States. It is well documented that covotes can be responsible for high rates of predation on white-tailed deer (Odocoileus virginianus) fawns, which may partially explain the decline in deer numbers observed in portions of the Southeast over the last decade. Previous studies have shown that coyote densities vary across the landscape due to habitat preferences. Knowledge of coyote populations within deer management units is essential to make deer management recommendations intended to compensate for reduced fawn survival caused by coyote predation. During the summers of 2019 and 2020 we will conduct coyote scat deposition surveys across 8 sample sites in the Piedmont, Sandhills, Upper Coastal Plain, and Lower Coastal Plain of South Carolina. At each sample site, scat collection will be conducted on 50 miles of low-maintenance roads every 3 days over a 2-week sampling period. We will genotype scat samples to detect unique individuals for spatial capture-recapture estimates of coyote abundance. By associating variation in coyote densities with adjacent landscape characteristics, we will assess landscape-level habitat preferences of covotes in South Carolina. We will use unique genotypes across the state to investigate population genetic structure of coyotes, which will help us better understand connectivity among populations. This study will assess covote populations across a broad geographic extent, which previous research has indicated best captures population demographics of this mobile species and is most applicable to management.

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Table 1.	Southeaster	<u>n state deer ha</u>	urvest summ	<u>aries for the</u>	2017-2018 or mo	st recent av	vailable sea	ISON.
	I and Area	Deer H	abitat	Darcant	0% I and Area		Harvest	
State	(sq. mi)	(sq. mile)	(% Total)	Forested	Public Hunting	Male	Female	Total
AL	51,628	46,981	91	69	5	114,116	103,291	212,400
AR	52,609	44,718	85	53	12	107,870	97,440	205,310
DE	1,954	1,592	36	15	10	7,038	8,266	15,304
FL	53,632	27,573	51	48	17	61,216	35,811	94,017
GA	57,800	38,674	67	67	9	162,612	219,017	381,629
КУ	40,395	39,654	97	59	6	74,913	61,113	136,026
LA	41,406	26,562	64	52	9.5	81,060	54,040	135,100
MD	9,837	8,766	89	39	4	30,247	53,135	83,382
MO	69,561	63,910	92	31	4	166,387	117,783	284,620
SM	47,296	31,250	99	66	6	95,112	99,449	194,975
NC	48,511	36,154	75	61	9	95,574	94,132	189,706
OK	69,919	37,425	54	19	3	64,749	43,165	107,914
SC	30,207	21,920	73	63	7.5	102,261	83,025	185,286
NT	42,246	25,770	61	49	6	81,988	62,765	144,753
XT	261,914	177,272	58	40	$\langle \rangle$	506,809	411,200	918,009
VA	39,589	35,640	90	61	11	108,530	82,093	190,623
WV	24,064	22,972	95	79	6	66,231	41,911	$108, 160^1$
Avg or Total	942,568	686,833	73.18	51.24	7.5	1,926,713	1,667,636	4,560,655

Table 1.	Continued. Page	e 2						
	Harvest/sq. mi.			Γ	ength of Season (Da	tys) <sup>3</sup>		
State	Deer Habitat	Method of Data Collec- tion <sup>2</sup>	Estimated Pre- season Popula- tion	Archery	Black Powder	Firearms	Method of Setting Sea- sons <sup>4</sup>	% Land Area Open to Dog Hunting
AL	4.5	A,B,C,E,F	1,300,000	119 (C)	5 (A)	90 (A,C)	A,B	67
AR	4.6	A,C, F, G	1,000,000	175 (C)	12 (C)	50 (C)	A,B	70
DE	9.6	B, F, G	36,000	136 (C)	15 (A,B)	42 (A,B)	A,B,C	0
FL	3.1	Щ		35-38	14	74-79	A,B	20
GA	9.6	A,C,D,E, F, G	1,200,000	128-145 (C)	92 (A,C)	85 (C)	A,B,C	23
КY	3.4	D,F,G	855,090	136 (C)	2(A), 9(B)	10-16 (C) + 4	A,B,C	0
ΓA	5.3	A,B,C	500,000	123(C)	14(A,B)	65	A,B,C	80
MD	9.5	B,C,D,F,G	222,000	101 (C)	3+9 (A), 13 (B)	13 (A), 2 (B),	A,B,C	0
MO	4.5	B,C,D,F,G	1,400,000	112	11	11-14+5 Jr	A,B	0
SM	8.1	C, E	1,575,000	123 (C)	12 (A)	75	B,C	06
NC	5.2	A,B,C,D,F,G	1,000,000	21-81	14	18-80	A,B,C	50
OK	2.4	A,C, E, online	500,000	107 (C)	6	16	A,B	0
SC	8.7	A,B,C	730,000	16 (A)	10 (A)	70-140	C	60
NL	6.4	A, mobile /online		40 (C)	14 (C)	60 (C)	A,B	0
XT	5.2	В	4.8-5.9 million <sup>5</sup>	35	14	65-93 (B, C)	A,B	0
VA	5.3	A,B,C,D,F	840,000	42-77	14-36	15-50	A.B	55
WV	4.7	Ч	476,000	93(C)	6 (C)	23 (C)	A,B,C	0
Avg. or Total	5.9		16.4 to 17.5 million					30.29

			Hunting Lie	anse Roes		<b>Tagging System</b>	
			(Full	Season)	Physical Tag?	Mandatory?	
State	No. of Hunters	5-Year Trend	Resident	Non-Resident	License Tag? None?	Volunteer? None?	Bonus Tags Avail- able?
AL	202,540	Stable	\$27.10	\$136.20-\$312.45	Hunter Log	Mandatory	DMAP
AR	249,064	Down	\$10.50 - 25	\$55 - 350	License Tag	Mandatory if not checked immediately upon harvest	DMAP
DE	20,404	Stable	\$39.50	\$199.50	Physical Tag	Mandatory	2 Antlered, Unlimited Ant- lerless
FL	98,110	Down	\$22	\$156.50	None	None	Yes
GA	359,262	Up	\$40	\$325	License Tag	Mandatory	WMAs
КY	298,534	Down	\$55	\$260	License Tag/ Hunter Log	Mandatory	Yes
LA	161,200	Down	\$29-50	\$300-352	Physical Tag	Mandatory	DMAP
MD	58,000	Stable	\$36.50	\$130	Physical Tag	Mandatory	Antlered only
МО	500,686	Stable	\$17	\$225	License Tag	Mandatory	Antlerless only
MS	132,112	Down	\$25-\$45	\$300-\$375	None	None	DMAP & FMAP
NC	234,678	Stable	\$36	\$160	License Tag	Mandatory	DMAP
OK	186,173	Stable	\$25	\$280	License Tag	Mandatory	DMAP
SC	146,044	Stable	\$25	\$235-375	Physical Tag	Mandatory	Yes & DMAP
NL	198,795	Stable	\$68-166	\$306	None	Mandatory	Select WMAs
XL	837,805	Stable	\$25	\$315	License Tag	Mandatory	MLDP tags
VA	194,000	Down	\$46-82	\$197-259	License Tag	Mandatory	Unlimited on private lands, antlerless only
WV	239,563	Stable	\$35	\$196	Physical Tag	Mandatory	Yes
Total	4,116,970						

Table 1. Continued, Page 3

I ante l	I. Continueu. Fage -								
		I	Ι	<b>Deer Relate</b>	ed Acc	sident	<i>C</i>		
			Fire	arms	Sta	nds	Ō	her	
State	Mandatory Orange	Crossbows Per- mitted	Injuries	Fatalities	Ini.	Fat.	Ini.	Fat.	Highwav Kill <sup>7</sup>
	D		•				,		<b>)</b>
AL	Yes	Yes	4	5	10	1	0	0	29,830 (C)
AR	Yes	Yes	4	0	15	0	0	0	22,531 (C)
DE	Yes	Yes	0	0	1	0	0	0	5,455 (C)
FL	WMAs only	Yes	NA	NA	NA	NA	NA	NA	17,653 (C)
GA	Yes	Yes	NA	NA	NA	NA	NA	NA	50,000 (C)
КУ	Yes	Season & Handicap	1	0	1	1	0	0	3,198 (A)
ΓA	Yes	Yes	С	2	2	0	0	0	10,098 (C)
MD	Yes	Yes	0	0	5	0	0	1	30,933 (C)
MO	Yes	Yes	5	0	ć	0	0	0	38,603 (C)
SM	Yes	Yes	13	1	4	1	0	0	22,155 (C)
NC	Yes	Yes	4	0	4	1	0	0	65,628 (C)
OK	Yes	Yes	б	0	ю	0	0	0	12,605 (C)
SC	WMAs only	Yes	13	0	4	0	0	0	2,764 (A)
NT	Yes	Yes							31,408 (C)
ΤX	WMAs only	Yes	2	0	0	0	0	0	59,105 (C)
VA	Yes	Yes	12	1	Ζ	7	NA	NA	59,600 (C)
WV	Yes	Yes	С	2	7	0	7	7	12,945 (A)
Total									474,511

		Leasing s/Acre	5-18+	6-10	ż	0-12	5-25	5-40	5-40	5-35	ć	ż	ć	5-10
		Avg. Fee	\$6	Ś		\$1	\$	\$	Ś	\$				S
	cess <sup>10</sup>	Firearms	~45	ć	ż		44		39	40	40	57		31.5
	% Hunting Suce	Muzzleloader	~20	ć	ż	44.5% Combined	1	46% Combined	19	25 (C)	I	32	50% Combined	21
		Archery	~15	ć	ż		10		18	34	17	40		30
		Antler Re- strictions <sup>9</sup>	A (one buck must have 4- points on 1 side), B (one county all bucks must have 3-points on 1 side), C (20 WMAs)	A,B,C No antler re- strictions within CWD Management Zone counties	One buck must have a spread ≥15"	V	A (One buck must be 4- points on 1 side) B (9 counties are more restricted)	С	No	3-pt restriction on two bucks	Yes, 39 counties	С	NA	No
		Antlered	3	2	2	2/day <sup>8</sup>	2	1	2, 1 either-sex	2 with 1 bonus in Region B	2; 1 with fire- arm	3	2	2
age 5	Limits <sup>8</sup>	Antlerless	1 per day	3-6	4+	1 or 2/day <sup>8</sup>	10	Varies	3, 1 either-sex	2 in Region A, 35 in Region B	Varies	3/2	48	Up to 6
Continued, F		Season	3/None <sup>8</sup>	9	None	2/day <sup>8</sup>	12	None	6 statewide/3 in 2 of 10 deer areas	Varies	Varies	6/5	6 <sup>8</sup>	6
Table 1. (		State	AL	AR	DE	FL	GA	ΚУ	ΓV	MD	МО	SM	NC	OK

\$8-20	ċ	\$7-30	NNK	\$3-10	
62	ć		~51	36	46
25	¢.	61% Combined	~37	11	30.2
28	ζ.		~30	37	25.9
A (on part of buck bag limit) C (16 WMAs)	C (on select WMAs)	Yes, 117 counties	On 2 WMAs + 7 counties	6 WMAs	
5	2 statewide	Up to 3	3 (east)& 2 (west)	Up to 3	
+7	Varies	Up to 5	9	Up to 8	
+6	None	5	6 (east) & 5 (west)	10	
SC	NT	ΤX	VA	ΛM	Avg.

		Private L	ands Progra	ms			
State	Type <sup>11</sup>	Min. Acreage Requirements	Fee	No. of Cooperators	Trailing wounded deer with dogs legal?	Supplemental feeding legal?	Baiting legal?
AL	Α	None	None	100	Yes	Yes	No
AR	Α	500	None	200	Yes	Yes (except in CWD Zone where bait may only be used from Sept. 1-Dec. 31)	Yes, Private
DE	DDAP SDDAP	None	None	104 306	No	Yes	Yes, Private
FL	Α, C	640; 5000	None	1,360; 19	Yes	Yes	Yes, Private
GA	А	TBD	TBD	TBD	Yes	Yes	Yes
КY	В	None	None	500	Yes	Yes (except March – May)	Yes, Private
LA	А	40	Yes	710	Yes	Yes	Yes, Private
MD	None				Yes	Yes	Yes, Private Only.
ОМ	В	Ś	None	150,000	Yes	Yes (except CWD zone)	No
SM	A,D	Variable	None	442	Yes	Yes	Private land only
NC	А	Regional; 1,000/500	\$50	49	Yes	Yes	Yes, Private
OK	А	1,000	\$200-400	150	Yes	Yes	Yes, Private
SC	А	None	\$50	1,421-3.1 mil ac	Yes	Yes	Yes, Private
NT	None				With officer approval	Yes	No
XL	А	None	None	7,030 properties under a wildlife management plan	Most of Texas	Yes	Yes

Table 1. Continued. Page 6

	No	$\mathrm{Yes}^{12}$	
	No (Sept 1 – first Sat in Jan)	$Yes^{12}$	
	Yes (weapon allowed)	No	
<ul> <li>137 wildlife cooperatives (4,500 + members)</li> <li>31.3 mil ac</li> </ul>	914 738 10		
	None		
	None		
	DCAP DMAP DPOP	None	
	VA	WV	

Table 1. Continued; footnotes. Page 7
<ol> <li><sup>1</sup> Total harvest includes deer of unknown gender.</li> <li><sup>2</sup> 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.</li> <li><sup>3</sup> A-Early Season; B-Late Season; C-Full Season.</li> <li><sup>4</sup> A-Harvest &amp; Biological; B-Departmental/Commission Regulatory; C-Legislative.</li> </ol>
<ul> <li><sup>6</sup> Asterisk if estimate suburd for us compared to estimates provide to changed incurrence or generation of a sterisk if estimate includes landowner exempted hunters.</li> <li><sup>7</sup> A-Actual number based on reports; B-Estimated road kill; C-State Farm estimate</li> <li><sup>8</sup> AL - 3 antlered bucks per season. No season limit on antlerless deer.</li> </ul>
FL – A total of two deer may be harvested per day. Both may be antlerless deer during archery season and it taken with antlerless deer permits. Only one/day may be antlerless during firearms antlerless deer seasons. MD – In Region B: 10 antlerless deer limit in firearms, 10 antlerless deer limit in muzzleloader, 15 antlerless deer limit in archery. In Region A: 2 antlerless deer limit, no more than one per weapon season. Statewide Antlered Deer Limit: Two antlered deer, no more than one in a weapon season. One hours antlered deer may be harvested in Region B during any weapon season.
MO – No daily or annual limit of antlerless deer but number that can be harvested in each county varies. NC – Unlimited bonus antlerless tags are available during the Urban Archery Season in participating municipalities. <sup>9</sup> A–Statewide Antler Restrictions; B–County Antler Restrictions; C–Region or Area Antler Restrictions.
<sup>11</sup> A-DMAP; B-Landowner tags; C-Antlered buck tags; D-Fee MAP. <sup>12</sup> Except for year round ban in CWD area and public land from September 1 through December 31. Note: All states require hunter education, permit handguns for use on deer, and do not permit use of drugged arrows on deer.



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