2018 Proceedings
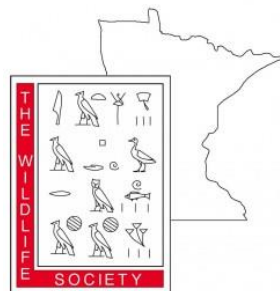## 42nd Annual Meeting
Midwest Deer and Wild Turkey Study Group

August 27-30th, 2018
Camp Ripley, Minnesota

Submitted by:
Lindsey Messinger, Andrew Norton, and Tyler Obermoller

October 2018

Cover design: Mandy Lipinski

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BACKGROUND

The Midwest Deer and Wild Turkey Study Group (MDWTSG) meeting is an annual gathering of wildlife managers sanctioned by and affiliated with the Midwest Association of Fish and Wildlife Agencies. Primary objectives of the meeting include dissemination of deer and wild turkey management strategies, discussion of emerging or existing issues associated with deer and wild turkey management, and coordination of regional deer and wild turkey management or research efforts. The meeting location rotates among the Midwestern states that are active within the group. Forums such as the MDWTSG meeting provide valuable opportunities for state deer and turkey biologists to become acquainted with emerging issues and exchange information and ideas related to deer and turkey research and management. The need for state fish and wildlife agencies to establish and maintain deer and turkey biologist positions and support travel of these biologists to the annual MDWTSG meeting is imperative for exchanging information to promote quality wildlife management and research in each state. It is more important than ever that state agencies are at the forefront of issues related to deer and turkey management in order to protect the heritage and recreational opportunities of hunting for future sportsmen and sportswomen.

MEETING TIME & PLACE

The Minnesota Department of Natural Resources in partnership with the Minnesota Chapter of The Wildlife Society (MNTWS) hosted the 2018 MDWTSG meeting at Camp Ripley in Little Falls, Minnesota on August 27-30. The MDWTSG appreciates the financial support provided by the National Wild Turkey Federation (NWTF) and the Quality Deer Management Association (QDMA), as well logistical support provided by MNTWS.

ATTENDANCE

The 2018 meeting was attended, in total, by 51 participants and speakers, including state deer and/or wild turkey biologists from 12 Midwest member states (Indiana, Iowa, Illinois, Kansas, Kentucky, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin), and biologists and researchers from the NWTF, QDMA, University of Minnesota Extension, Michigan State University, Midwest Wild Turkey Consortium, Purdue University, US Geological Survey National Wildlife Health Center, and University of Nebraska-Lincoln.

EXECUTIVE SUMMARY

Attendees were welcomed by Lou Cornicelli, Wildlife Research Program Manager, Fish and Wildlife Division, Minnesota Department of Natural Resources. Following the meeting introduction, there were joint session presentations over two days on the following topics:
- Citizen Science
- Habitat Degradation and Quality
- Disease
- Population Inference, Management Goals, and Season Structure

Concurrent sessions over the two days focused on species-specific topics including:
- Chronic Wasting Disease (Deer)
- Wild Turkey Recruitment and Genetics, brood survey standardization, Future Research Priorities (Wild turkey)

Wild Turkey Concurrent Session Summary

Attending biologists unanimously agreed to adopt the brood survey standardization protocol developed by the Southeast Wild Turkey working group. Most states already conducting brood surveys currently fall within the protocol. MN and NE were the only states in attendance that do not

currently conduct brood surveys but agreed to adopt the standardized protocol if brood surveys are initiated in the future. At the request of the National Wild Turkey Federation Wild Turkey Technical Committee, attending biologists drafted a list of Future Search Priorities. This list was added to and edited via e-mail in the weeks following the 2018 Midwest Deer and Wild Turkey Study Group Meeting and was provided to J. Isabelle (MO and chair NWTF technical committee). Other discussion included brainstorming ways NWTF might assist with population monitoring projects (supply citizen science volunteer base, produce promotional/instructional videos and social media packages). These ideas were presented to several executive office NWTF staff in attendance.

BUSINESS MEETING

The business meeting was conducted as a joint session involving both deer and wild turkey program leaders. The 2019 MDWTSG meeting will be hosted by the Indiana Department of Natural Resources.

Business meeting was called to order on August 29, 2018 at 15:03.
Several items of business were brought before the group:

1. A. Norton (meeting chair, MN) for G. Jenkins (KY) presented possible proposal for creation of an Elk Working Group. As elk topics have been discussed at previous MDWTSG meetings, there was recognition of potential overlap between MDWTSG. K. Fricke (KS) proposed no action be taken and G. Jenkins should work on a proposal to formally bring to the group asking for MDWTSG support of a separate Elk Working Group. If support is granted, MAFWA will be notified of a resolution for consideration of a new Elk Working Group.

2. A Norton (meeting chair, MN) for A. Lindbloom (SD) brought to the attention of the group the cost of maintaining the current website. Website fees were previously nominal and were being paid by various state agencies. Now fees are more significant. There were discussion regarding the utility/value of a MDWTSG website (i.e. repository for historical documents, contact list of agency members). A motion was called to pay the current website bill by B. Jensen (ND) which was seconded by J. Lusk (NE). A. Norton called a vote and it was approved by a majority 'yay' vote. J. Stenglein (WI) brought forth a motion for an ad hoc subcommittee to discuss a longer-term solution for website (purpose, financing, archiving needs of the group). This motion was seconded by D. Storm (WI) and approved by A. Norton. J. Stenglein will serve as committee chair and A. Lindbloom (SD), J. Caudell (IN), B. Jensen (ND) volunteered to serve on the committee and to report back to A. Norton.

3. K. Wiskirchen (MO) proposed the creation of a document to show a united stance on management of CWD that would be pertinent to the Midwest. Discussion of a larger document already in existence that may cover these ideas ensued and there was a motion to create an ad hoc subcommittee to monitor and evaluate the specific concerns surrounding CWD pertinent to the Midwest and the progression of the larger document. The subcommittee was approved by A. Norton. K. Wiskirchen and B. Jensen (ND) volunteered to serve as members on the committee and to report back to A. Norton.

4. J. Coffey (IA) motioned that Indiana host the 2019 meeting in accordance with the existing cycle. Motion was seconded by K. Fricke (KS) and was passed by a majority 'yay' vote.

A motion to adjourn the meeting was proposed and seconded and the meeting adjourned on August 29, 2018 at 15:53.

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AGENDA

Monday – August 27

4:00-7:00 pm   Arrival (dinner on your own)
                      Registration and Lodging Check-in at Ed Center Front Desk (Area 6; West
                      Entrance)

7:00-10:00 pm   Evening Social

Tuesday - August 28

6:00-7:45 am   Breakfast, Ed Center Cafeteria

7:00-8:00 am   Registration and Speaker Presentation Upload – Ed Center 168

1.1 WELCOME AND INTRODUCTION – Ed Center 168

8:00-8:20 am   ***Welcome, Overview of Schedule, Housekeeping Items***

8:20-8:40 am   **Introduction**
                      Lou Cornicelli

1.2 JOINT MEETING - CITIZEN SCIENCE – Ed Center 168

8:40-9:10 am   **Citizen Science – A Tool for Wildlife Managers?**
                      Rob Blair

9:10-9:30 am   **Using Citizen Science with Deer Management Assistance Program**
                      Participants to Help Understand the Relationships between Habitat
                      and Deer Demographics and Health
                      Curt Rollman

9:30-10:00 am   **Hunting for Information: How Bow Hunters Help Monitor Wildlife**
                      Population Trends in Iowa
                      Tyler Harms

10:00-10:20 am   **NWTF's Role to Bring Citizen Scientists into the Family Flock to Save**
                      the Habitat. Save the Hunt.
                      Jason Lupardus

10:20-10:30 am   Break

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1.3 JOINT MEETING - HABITAT DEGRADATION AND QUALITY – Ed Center 168

10:30-10:50 am	**Using Spring Spotlight Observations to Estimate Landscape-scale Resource Selection and Abundance for White-tailed Deer in Iowa** Dan Kaminski
10:50-11:10 am	**Potential Impacts of Fine-scale Land Cover Characteristics on Wild Turkeys in the Midwest** Joanne C. Crawford

1.4 JOINT MEETING - DISEASE – Ed Center 168

11:10-12:00 pm	**CWD Overview** Bryan Richards
12:00-1:00 pm	Lunch
1:00-1:50 pm	**Chronic Wasting Disease in Midwestern Deer: Infection, Mortality, and Implications for Management** Michael Samuel
1:50-2:00 pm	Break

1.5-A CONCURRENT SESSION - DEER: CWD – Ed Center 168

2:00-2:20 pm	**Chronic Wasting Disease Surveillance and Management in Missouri** Kevyn Wiskirchen
2:20-2:40 pm	**Responding to a Recent Outbreak of Chronic Wasting Disease in Wild Deer in Minnesota** Michelle Carstensen
2:40-3:00 pm	**Sixteen years of CWD Management in Illinois** Doug Dufford
3:00-3:20 pm	**Innovative Research Applications for CWD Management in Michigan** Jon Cook
3:20-4:30 pm	*CWD Discussion*

1.5-B CONCURRENT SESSION - TURKEY: RECRUITMENT AND GENETICS – Ed Center 154/155

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2:00-2:30 pm	**Subspecies of Wild Turkey – Fact or Fiction?** Bob Zink
2:30-3:00 pm	**Regional Productivity Trends** Kent Fricke
3:00-3:30 pm	***Brood Survey Standardization Discussion***
6:00-7:00 pm	Dinner, DeParcq Woods (Area 30)
7:00-10:00 pm	Evening Social, DeParcq Woods (Area 30)

Wednesday - August 29

6:00-7:45 am	Breakfast, Ed Center Cafeteria

2.1 JOINT MEETING – POPULATION INFERENCE, MANAGEMENT GOALS AND
SEASON STRUCTURE – Ed Center 168

8:00-8:30 am	**Deer Management Program Goals, Plans and Formal Reviews** Matt Ross
8:30-9:00 am	**An Evolution of Deer Population Goals and Season Setting in Minnesota: More Public and Structured Input** Erik Thorson
9:00-9:20 am	**Influence of Heterogeneity in Catchability on Population Inferences** Joanne C. Crawford
9:20-9:40 am	**Occupancy Modeling Surveys for Turkeys and Factors that Drive Turkey Populations** Chris Pollentier
9:40-10:00 am	**A Look Down the Kansas Deer Management Highway** Levi Jaster
10:00-10:20 am	Break
10:20-10:50 am	**A Data-driven Framework for Integrated Deer Management in Indiana** Robert Swihart

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10:50-11:10 am **Using Technology and Data to Guide Deer Management Decisions in South Dakota**
Andy Lindbloom

11:10-11:30 am **Modernizing Sex-Age-Kill Deer Population Estimates in Wisconsin**
Jen Stenglein

11:30-11:50 am **Southwest Wisconsin CWD, Deer, Predator Project: Year 2 Update**
Dan Storm

12:00-1:00 pm Lunch, Ed Center Cafeteria

2.2-A CONCURRENT SESSION - DEER: GENERAL DISCUSSION – Ed Center 168

1:00-2:30 pm *Harvest Strategies and Survival, Population Goals, Season-structure, and Estimates/Monitoring Discussion*

2.2-B CONCURRENT SESSION - TURKEY: GENERAL DISCUSSION – Ed Center 154/155

1:00-1:20 pm **Harvest and Hunter Satisfaction Following Implementation of Spring Wild Turkey Hunting Zones in Ohio**
Mark Wiley

1:20-2:30 pm *Quantifying Harvest and Hunter Effort, Generate List of Regional Research Priorities for NWTF RFP*

2:30-3:00 pm Break

2.3 – JOINT BUSINESS MEETING – Ed Center 168

3:00-4:00 pm *Agency Representative Business Meeting*

6:00-7:00 pm Dinner, DeParcq Woods (Area 30)

7:00-10:00 pm Evening Social, DeParcq Woods (Area 30)

Thursday - August 30

6:00-7:45 am Breakfast, Ed Center Cafeteria

7:00-11:00 am Check-out and Departure

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ABSTRACTS

Tuesday - August 28

1.1 WELCOME AND INTRODUCTION

Introduction
Lou Cornicelli, Minnesota Department of Natural Resources

1.2 JOINT MEETING - CITIZEN SCIENCE

Citizen Science – A Tool for Wildlife Managers?
Rob Blair, University of Minnesota Extension
In this talk, Rob Blair – Professor in Fisheries, Wildlife, and Conservation Biology at the University of Minnesota – will introduce the burgeoning field of citizen science and explore its applicability to wildlife sciences. Specifically, he will discuss how to decide if it is an appropriate platform for a project, cover what is required in training and managing volunteers, and offer examples of successful projects.

Using Citizen Science with Deer Management Assistance Program Participants to Help Understand the Relationships between Habitat and Deer Demographics and Health
Curt Rollman, Wisconsin Department of Natural Resources
To relate deer health to habitat quality across the state of Wisconsin, the Department of Natural Resources has begun a collaborative project with landowners who have enrolled in the state's Deer Management Assistance Program (DMAP). This is an overview of the public recruitment process and development of instructional data collection materials to assess deer body condition. Landowners were recruited in summer, 2017 through a series of workshops and email announcements. A variety of tools were developed to facilitate quality data collection by landowners. A detailed protocol was provided in a kit that contained supplies necessary for data collection. A training video was filmed and posted to the DMAP website, and an electronic datasheet was developed to allow cooperators to submit data from their computers or smartphones using Survey123 by ESRI. Paper datasheets and postage-paid envelopes were provided for landowners as an option to submit data via U.S. mail. A pilot study in 2016 resulted in 12 landowners submitting data on 56 deer. Based on participant feedback, we modified the protocol for 2017 to increase efficiency and clarify instructions. Data submitted by pilot participants was used to determine the most useful metrics for assessing body condition of deer in the fall. Pilot study participants were enthusiastic and all re-enrolled in the project in 2017. About 77 DMAP cooperators signed up to participate in the project in 2017. We received data from over 300 deer from these cooperators.

Hunting for Information: How Bow Hunters Help Monitor Wildlife Population Trends in Iowa
Tyler Harms, Iowa Department of Natural Resources
Harms, T. M., W. R Clark, and D. J. Kaminski
Monitoring population trends, particularly for game species, is a critical component of wildlife conservation and management. However, implementing monitoring programs across broad spatial and

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temporal scales can be both logistically challenging and expensive. Programs that utilize volunteer data collectors (i.e., citizen scientists) have increased in popularity among many agencies and organizations as an avenue for collecting information across broad spatial and temporal scales for a fraction of the staff and financial commitment of more traditional monitoring programs. Each year since 2004, we sent diary surveys to approximately 9,000 bow hunters as part of the annual Iowa Bow Hunter Observation Survey, a survey designed to provide an index to monitor populations of White-tailed Deer and other select wildlife species statewide. Participating hunters were asked to log the number of individuals seen of 12 different wildlife species while in the deer stand or blind, which is then standardized by the number of hours spent in the deer stand or blind by county. Since 2004, hunters have recorded an average 2,975 hunting trips at 3.37 hours per trip. Total deer observed by hunters ranged from 1,378 (per 1,000 hours hunted) in 2013 to 1,737 in 2006. Observations of Wild Turkey ranged from 424 (per 1,000 hours hunted) in 2013 to 591 in 2005. The data collected by hunters as part of this survey are a critical index in the population model for White-tailed Deer in Iowa and can be used for future population modeling efforts for other species. Furthermore, these data serve as our best population index for a number of important species including Bobcat, River Otter, and both Red and Gray Fox.

NWTF's Role to Bring Citizen Scientists Into the Family Flock to Save the Habitat. Save the Hunt.
Jason Lupardus, National Wild Turkey Federation
The National Wild Turkey Federation works closely with a membership base of over 225,000 people to provide a science foundation for conservation management with a focus on wild turkeys. We have worked closely with volunteers in multiple states to provide them with the necessary tools to grow them into citizen scientists that assist our focused conservation partnership efforts. Migratory bird surveys, biological sampling, turkey/poult surveys, and finding R, T, & E flora & fauna have been some of the significant contributions by citizen scientist volunteers as part of our family flock.

1.3 JOINT MEETING - HABITAT DEGRADATION AND QUALITY

Using Spring Spotlight Observations to Estimate Landscape-scale Resource Selection and Abundance for White-tailed Deer in Iowa
Dan Kaminski, Iowa Department of Natural Resources
Kaminski, D. J., T. M. Harms, and J. M. Coffey
Nocturnal spotlight surveys provide a low-cost and easily implemented survey method for white-tailed deer and can yield large spatial datasets applicable to a variety of habitat suitability modeling procedures. By understanding how populations distribute according to a resource selection function (RSF) for a reference area, density and abundance can be estimated for larger areas assuming the relationship between habitat and abundance are equal across the study area. Habitat-based density estimators have been applied to a number of species and proven useful for addressing various conservation and management concerns. Although achieving reliable population estimates is a primary goal for spotlight surveys, presence-only models have yet to be applied to spotlight data for estimating habitat selection and abundance for deer. Using spring spotlight data from 2012–2017, we estimated the relative probability of use for deer in Iowa using a RSF and 9 landscape-scale habitat variables. We developed spatially-explicit RSF models in a geographic information system (GIS) withholding each year from the model set for k-fold cross validation. All models were highly correlated ($|r|$>0.99) and had high fit with their respective test datasets ($R^2 \geq 0.96$, $p<0.001$), and the mean number of deer observed had a significant and positive

relationship with the amount of suitable habitat within each county (R^2=0.59, p<0.001). Therefore, we applied two methods to estimate statewide abundance from the RSF. We calculated viewshed along each transect in a GIS to correct for the amount of actual surveyed area and applied 1) a habitat-based density estimator to extrapolate deer counts per 10 ordinal RSF classes (low to high suitability) statewide, and 2) zero-inflated Poisson and negative binomial models to predict abundance from RSF values and ordinal classes. Population estimates were similar across all models within years, and were also similar to those produced by a statewide deer population accounting model and spotlight distance sampling estimates indicating habitat-based estimates performed well. All models produced relatively precise estimates averaging less than ±50,000 deer across years. Estimates were significantly lower for 2012 indicating that annual variability may impact estimates unless factors impacting spotlight counts (i.e., weather) are accounted for.

Potential Impacts of Fine-scale Land Cover Characteristics on Wild Turkeys in the Midwest
Joanne C. Crawford, Michigan State University
Crawford, J. C., and W. F Porter
We quantified landscape composition and configuration for Midwestern states using National Land Cover Data satellite imagery from 2001, 2006, and 2011 (focal years). For each state, we calculated proportions of land cover and landscape metrics at the county level and within counties in circular sampling units of 3.14 km2 and 79.0 km2 (1- and 5-km radii, respectively). We modeled the influence of landscape covariates on turkey harvest at the county scale using generalized linear mixed models with a negative binomial response structure and an offset term to account for hunter effort where available. We detected little change within individual counties in the proportions of forest, grasslands, and agriculture between the 2001 and 2011 focal years, however, spatial-temporal variation within states was evident. The influence of landscape characteristics was context-specific; western states dominated by grassland and agriculture had positive associations with the proportion of grassland available within 5-km sampling units. States with relatively high amounts of forest had the highest harvest indices where 5-km sampling units were composed of 40-60% forest; turkey harvests declined at greater proportions of forest. These results echo the findings of previous research in the eastern U.S. and suggest that small-scale changes to the landscape may influence wild turkey populations. However, quantifying changes on scales that are biologically relevant to wild turkeys remains a challenge. We discuss these results and other subtle changes to the landscape brought about by "clean" farming that may negatively impact turkey populations in the future.

1.4 JOINT MEETING - DISEASE

CWD Overview
Bryan Richards, United States Geological Survey National Wildlife Health Center

Chronic Wasting Disease in Midwestern Deer: Infection, Mortality, and Implications for Management

Michael Samuel, University of Wisconsin-Madison, United States Geological Survey Wisconsin Cooperative Wildlife Research Unit

Chronic wasting disease (CWD) is a fatal neurodegenerative disease affecting free-ranging and captive cervids. Despite the potential threat of CWD to Midwestern deer populations little is known about the rates of infection and mortality caused by this disease. We used epidemiological models to estimate the force-of-infection and disease-associated mortality for white-tailed deer in the Wisconsin and Illinois CWD endemic zones. Models were based on age-prevalence data corrected for bias in aging deer using the tooth wear and replacement method. Both male and female deer in the Illinois outbreak had higher corrected age-specific prevalence with slightly higher female infection than deer in the Wisconsin outbreak. We found that adult male deer have > 3-fold higher risk of CWD infection than female deer. Males also had higher disease mortality than female deer. As a result, CWD prevalence was 2-fold higher in adult males than females. Although infection rates were similar in the 2 states, deer density is much higher in Wisconsin. This provides further supports for the conclusion of Jennelle et al. (2014) that CWD operates as a frequency dependent disease. As a result, management to control CWD should focus on reducing disease prevalence. I will discuss several different management actions to help control CWD prevalence and spread.

1.5-A CONCURRENT SESSION - DEER: CWD

Chronic Wasting Disease Surveillance and Management in Missouri

Kevyn Wiskirchen, Missouri Department of Conservation

Missouri began Chronic Wasting Disease (CWD) surveillance in 2001 and first detected CWD in it's free-ranging white-tailed deer population in 2012. Since that time, a total of 75 CWD-positive deer have been detected, and although known geographic distribution of the disease has increased, disease prevalence in established locations has remained low (<4%). The goals of Missouri's CWD Management Plan are to 1) detect the disease as early as possible where it exists, 2) determine prevalence and monitor distribution of CWD where it exists, 3) apply management actions to limit the spread of CWD, and 4) provide accurate and relevant information on CWD to the public, staff, and other stakeholders. To effectively accomplish the first two objectives, beginning in 2016 mandatory CWD testing was implemented in select counties during opening weekend of firearms deer season. This regulation greatly increased the sample size and distribution of samples (>25,000 samples) compared to what the agency was able to achieve through voluntary sampling alone (typically 3,000 – 7,000 samples in previous years). Statewide surveillance includes samples collected with cooperating taxidermists across Missouri each year. To achieve the 3rd objective, CWD Management Zones are established to include counties that are within approximately 25 miles of positive deer and regulations are implemented to limit the risk of spreading the disease. Winter culling is used to remove additional positive deer after the conclusion of the deer season and decrease deer densities at a localized scale around the locations of positive deer. Ongoing research within Missouri is helping inform and guide CWD surveillance and management efforts. Communication with the public (objective 4) is achieved through social media, Department publications, press releases, radio and TV, and interpersonal communication. However, misinformation and confusion about CWD remains one of the greatest challenges. Additional challenges include litigation, staff fatigue, landowner support in culling areas, and carcass transportation and disposal. Despite these challenges, management of CWD remains one of the highest priorities for the agency. Given CWD does not respect borders, a unified effort to increase surveillance and management across North America would benefit all.

Responding to a Recent Outbreak of Chronic Wasting Disease in Wild Deer in Minnesota
Michelle Carstensen, Minnesota Department of Natural Resources
Carstensen, M., E. Hildebrand, L. Cornicelli, C. Jennelle, M. Dexter, P. Hagen, and K. LaSharr,
In fall 2016, the Minnesota Department of Natural Resources (MNDNR) sampled 2,966 hunter-harvested white-tailed deer (*Odocoileus virginianus*) for chronic wasting disease (CWD) in southeastern Minnesota. The surveillance effort focused on testing deer within deer permit areas (DPA) in the 300 series zone, in response to increased incidence of CWD in wild deer in both southwest Wisconsin and northeast Iowa. Three deer tested positive for the disease in Fillmore County (DPA 348) and MNDNR enacted its CWD Response Plan which called for an immediate ban on recreational deer feeding, a formal survey of the area CWD was found, creation of a disease management zone (DPA 603), and additional sampling efforts to better understand the prevalence and spatial extent of the outbreak. During a winter (January-March 2017) supplemental surveillance effort, an additional 1,179 samples were tested through three operational phases; a special late hunt, landowner shooting permits, and a contract with United States Department of Agriculture–Wildlife Services for targeted deer removals. As a result, 8 more CWD positive deer were found. Surveillance efforts for CWD were intensified in southeastern MN in fall 2017 and also expanded into 2 other areas of the state (Crow Wing and Meeker Counties) where the disease was recently discovered in captive cervid farms. During the opening weekend of the 2017 deer season (Nov. 4-5), we conducted mandatory surveillance around these areas and collected over 12,000 samples in the three focus areas. To date, we have identified a total of 17 CWD positive deer, all within the existing disease management zone. In late November 2017, CWD was discovered in a third captive cervid farm not far from the CWD zone, which will increase surveillance in that area starting in 2018. This will bring the total number of areas currently under surveillance to 4: 1 wild of unknown origin and 3 captive cervid farms. From the multiple perspectives, a prolonged CWD response is neither practical nor affordable. For example, during the 2016 and 2017 deer seasons, MNDNR expended 28,300 hours of staff time (equivalent to 14 full-time employees) on CWD surveillance/response and spent $2.4 million hunter dollars on the effort. This comes at a time of chronic staff and budget shortages within the agency and multiple competing work priorities. Prolonged responses also impact staff morale and attitudes toward success. In addition, we see fatigue among hunters and landowners, along with diminished support for the response and increased negative perceptions about the agency. Given people are not observing direct mortality, it is difficult to communicate with stakeholders the importance of long-term objectives regarding disease establishment.

Sixteen years of CWD Management in Illinois
Doug Dufford, Illinois Department of Natural Resources
Chronic Wasting Disease (CWD) was first detected in November of 2002 in the north central part of Illinois near Rockford Illinois. Since that time, the Illinois Department of Natural Resources (IDNR) has been implementing an aggressive effort to maintain low prevalence rates and minimize spread. Through localized population reduction using recreational hunting seasons supplemented with agency culling, prevalence has been maintained at approximately 1%. Unfortunately these efforts have been less effective at containing spread as the disease has expanded from 4 counties initially to 17 counties today. This presentation will describe how CWD has changed on the landscape as well as look at the local impacts of disease management on deer numbers and harvest results.

Innovative Research Applications for CWD Management in Michigan
Jonathan D Cook, Michigan State University
Cook, J. D., N. Thompson, J. Trudeau, S. A. Christensen, D. M. Williams, and W. F. Porter
Chronic wasting disease (CWD) is a transmissible spongiform encephalopathy that affects at least seven North American cervid species, including white-tailed deer. Since its discovery in Colorado in 1967, CWD has become a serious threat to the sustainable future of susceptible host species because of long-term population declines in deer herds where the disease is well established. To prevent disease establishment, wildlife managers need information regarding the current state of disease to make rapid assessments and implement aggressive management actions. However, their decisions are almost always made with limited information regarding the local extent of disease, site-specific deer behavior, and management approaches that will be most successful in slowing or stopping the spread of disease. In this talk, we will introduce a collaborative initiative, the Michigan Deer Disease Initiative, led by the Boone and Crockett Quantitative Wildlife Center whose mission is to use cutting-edge analytics and field initiatives to address many of the most challenging aspects of wildlife disease management. We will highlight several applied studies currently in progress to help: find diseased animals early, understand localized movements and behaviors of deer in a disease area, and provide managers with information regarding the most efficient and effective ways to remove CWD from the landscape. We will also emphasize the need to maintain communication and collaboration between state agencies and academic researchers across CWD-affected states so as to maximize the ability to manage the disease, now and in the future.

1.5-B CONCURRENT SESSION - TURKEY: RECRUITMENT AND GENETICS

Subspecies of Wild Turkey – Fact or Fiction?
Bob Zink, University of Nebraska-Lincoln

Regional Productivity Trends
Kent Fricke, Kansas Department of Wildlife, Parks and Tourism

Wednesday - August 29

2.1 JOINT MEETING – POPULATION INFERENCE, MANAGEMENT GOALS AND SEASON STRUCTURE

Deer Management Program Goals, Plans and Formal Reviews
Matt Ross, Quality Deer Management Association
Deer management is not a "one size fits all" recipe. Successful deer management requires a scientific approach that is transparent to the public and supported by hunters. We surveyed each state wildlife agency in the contiguous United States to determine the parameters used for their deer program goals, whether they had a published deer management plan, and whether their deer management program had been subjected to a formal evaluation, audit or lawsuit. Hunting opportunity was used as a program goal by 67 percent of states, followed by deer herd density (64 percent), and deer herd health (62 percent). Twenty-three states have published deer management plans, and 19 of those have been updated within the past 10 years. Ten states have been subjected to a formal deer program evaluation, and six of

those have occurred within the past five years. Four states' deer management programs have been audited, and four have been subjected to a lawsuit. Given the whitetail's importance to the entire hunting industry and wildlife management system, all states should have a published deer management plan created with input from all deer stakeholder groups. The most successful deer management programs include local deer herd demographic data, combined with other local variables including environment, habitat productivity, hunting culture, and more. It is important for state wildlife agencies to use scientifically sound variables that are measurable and well defined by a public input process.

An Evolution of Deer Population Goals and Season Setting in Minnesota: More Public and Structured Input
Erik Thorson, Minnesota Department of Natural Resources
Thorson, E. M., L. E. McInenly, A. S. Norton, and L. Cornicelli.
Prior to the mid-2000s, deer population goals in Minnesota were largely set by Department of Natural Resources (DNR) area wildlife managers using their professional judgement while considering various views. A DNR led stakeholder-based process that included public input opportunities was used in 2005-2007, 2012, 2014, and 2015 to set population goals in each deer permit area (DPA) in the state. The most recent effort was designed to better involve citizens and improve satisfaction with the process through random landowner and hunter surveys, a team member application and screening process, public input meetings, and publicly posting the results. Likewise with our annual season setting process, we have moved from systems based on dispersed data entry and informal input from primarily area wildlife staff to ones that are more rigorous, structured, and inclusive. For example, the two major inputs to our annual population modeling efforts, hunter harvest and winter severity index (WSI), were once entered manually or measured by wildlife staff across the state. These two major data collection efforts have been automated and replaced by our electronic licensing system mandatory registration, and a GIS-based system of calculating WSI from weather observation stations collected from more locations than traditional staff monitoring stations. This past year, we designed a wildlife manager survey in Qualtrics to solicit more structured input about hunting season conditions and WSI accuracy to assist with the interpretation and modification of annual population estimates. As part of our new statewide deer management plan, wildlife managers are now scheduling biannual area deer meetings to solicit input from hunters and citizens on deer and deer management, which will also help inform our annual season setting efforts. These changes have resulted in a more credible and defensible deer management program at the DPA level and will hopefully lead to more improvements in the future.

Influence of Heterogeneity in Catchability on Population Inferences
Joanne C. Crawford, Michigan State University
Crawford, J. C., B. S. Stevens, and W. F. Porter
Harvest management programs commonly rely on indices to monitor changes in populations. Traditionally, harvest data has been used to index populations of many small game species, with the critical assumption that hunting will remove the same fraction of the population (or the same fraction per-unit of hunter effort) over time and in different management regions, and thus harvest-indices will reliably track spatial-temporal changes in populations. However, if hunter effectiveness or behavior changes systematically through space or time, then the fraction of the population removed per-unit of hunter effort (hereafter catchability) also changes, and catch-per-unit-effort (CPUE)) indices may not accurately reflect population change. Therefore, our objective was to evaluate the impact of heterogeneity of catchability on inferences obtained from CPUE abundance indices commonly used for management. We used harvest

and effort data for eastern wild turkeys (*Meleagris gallopavo silvestris*) from southern Michigan and simulated plausible changes to catchability to assess realistic effects on resulting inferences about spatial-temporal population change. Using observed county-scale harvest and effort data and simulated q values, we reconstructed turkey abundances that would produce the observed CPUEs, and compared spatial-temporal patterns in reconstructed abundances to those obtained assuming q was constant through space and time. We examined scenarios in which q increased or decreased incrementally over time and across space. Cases in which catchability increased or decreased resulted in increasingly large differences in reconstructed abundance over time and inferences about spatial patterns of abundance also changed with low or high values of q. Discrepancies in the accuracy of inferences about patterns of abundance resulting from heterogeneous q suggest that unmeasured changes in catchability can result in incorrect inferences about population change, which could in turn result in over- or under-harvest when CPUE indices are used to guide decision making in wild turkey harvest management.

Occupancy Modeling Surveys for Turkeys and Factors that Drive Turkey Populations
Chris Pollentier, Wisconsin Department of Natural Resources
Pollentier, C., S. D. Hull, and R. S. Lutz
Wild turkeys were successfully reintroduced in Wisconsin beginning in the mid-1970s and populations have since expanded beyond their ancestral range. Populations are now established throughout much of the state, with abundance generally considered highest in areas that are roughly 40–60% forest interspersed with agriculture and other open herbaceous landscapes. However, many areas across far northern Wisconsin are comprised of landscapes where forest area represents > 70% of the land cover. While much research has been focused to areas where populations are generally highest, research has been limited at best for turkey populations in far northern Wisconsin. To better understand turkey distribution across northern Wisconsin, we conducted gobbling call-count surveys from 2013–2017 and instituted a multiseason correlated replicate occupancy modeling approach to link landscape characteristics to patch occupancy. Understanding the current distribution of turkeys in heavily-forested northern landscapes will provide information needed to help guide contemporary management actions, which may differ considerably from current management approaches and research needs in landscapes where populations are considered abundant.

A Look Down the Kansas Deer Management Highway
Levi Jaster, Kansas Department of Wildlife, Parks and Tourism
Jaster, L., and L. B. Fox
From road kill to road-based spotlight surveys, Kansas deer population estimation and modeling has been markedly tied to roads; nearly since deer populations began recovering and the first modern deer season was held in 1965. As modeling grew in importance in deer management and new methods for estimation were developed, Kansas deer managers have altered how they estimate deer populations and set harvest goals. We first cover the historical route deer management has taken from establishment of the original deer management units, processing road kills, population estimation from biologist observations, and how goals were or were not set. We next cover the current methods utilizing roadside distance sampling and human dimension surveys used for estimation and goal setting in deer management. We then briefly discuss the likely road which we hope Kansas deer management can take into the future using new and some not so new methods and equipment.

A Data-driven Framework for Integrated Deer Management in Indiana
Robert Swihart, Purdue University
Swihart, R. K., J. N. Caudell, J. M. Brooke, J. A. DeWoody, B. G. Dillman, E. A. Flaherty, E. A. Jackson, M. A. Jenkins, Z. Ma, and P. G. McGovern
Managers have long recognized the value of integrating deer biology with ecological and sociological factors, but a formalized model with measurable inputs has remained elusive. We offer an historical perspective and rationale as it relates to deer management in Indiana, then outline a data-driven model to integrate biological limits on deer populations, attitudes of the public, and the agency's charge to manage deer for the people of Indiana. We describe a research program to calibrate, test, and assess cost effectiveness of model inputs and, ultimately, contribute to structured decision making for deer management. Specifically, we discuss a multifaceted set of regional data objectives that will be used to assess variation in attributes of deer populations, habitat condition, and human attitudes. As an initial step, we describe the process we used to delineate regional management units for deer in Indiana based on putative predictors of deer mortality as well as expert knowledge from agency professionals.

Using Technology and Data to Guide Deer Management Decisions in South Dakota
Andy Lindbloom, South Dakota Game, Fish, and Parks

Modernizing Sex-Age-Kill Deer Population Estimates in Wisconsin
Jen Stenglein, Wisconsin Department of Natural Resources
Wisconsin deer population estimation via the sex-age-kill formula was updated for the 2017 season to ensure that we were using the best available science to derive consistent and repeatable population estimates. The four major improvements were: 1. Formally incorporating data from nearby deer management units when constructing inputs, 2. Adding a hunter selectivity correction factor in Farmland DMUs, 3. Allowing uncertain parameters to remain uncertain, and 4. Estimating variance on inputs and population estimates. With these changes we estimated a statewide population estimate in 2017 that was very similar to the 2016 population estimate and had the benefit of being repeatable and more scientifically defensible than previous methods. These modernizations are the beginning of a longer-term look at improvements to Wisconsin's process for deer population estimation.

Southwest Wisconsin CWD, Deer, Predator Project: Year 2 Update
Dan Storm, Wisconsin Department of Natural Resources
In 2017, WDNR began field work on the Southwest Wisconsin CWD, Deer, Predator Project. To date, we have GPS-collared 332 deer and radiocollared 195 neonates. Of the GPS-collared deer, we have tested 307 for CWD at capture, 27 of which tested positive for CWD at capture. Year 1 survival of GPS-collared deer was ~75% for CWD-negative deer, and ~25% for CWD-positive deer. The harvest rate of collared deer during the 2017 hunting season was ~14%. Survival of fawns through August was ~72%. We monitored 46 GPS-collared buck fawns for dispersal in 2017 and found 60% (28/46) cumulative dispersal; 30% (14/46) dispersed in the spring and 41% (19/46) in the fall.

2.2-B CONCURRENT SESSION - TURKEY: GENERAL DISCUSSION

Harvest and Hunter Satisfaction Following Implementation of Spring Wild Turkey Hunting Zones in Ohio

Mark Wiley, Ohio Department of Natural Resources

In recent decades, the Ohio Department of Natural Resources, Division of Wildlife set statewide spring wild turkey hunting season dates in accordance with known nesting dates in southeast Ohio. Mounting hunter concern about spring weather in northeast Ohio prompted investigation of local nesting activity. ODNR determined nesting dates in this region were approximately 2 weeks later than those used to set the statewide spring hunting season. ODNR therefore established a 5-county zone in northeast Ohio with spring hunting dates 1 to 2 weeks later than the rest of the state. I will provide a summary of harvest trends and hunter satisfaction during the two spring wild turkey hunting seasons since implementation of distinct zones in 2017.

ATTENDEES

List of participants: 2018 Midwest Deer & Wild Turkey Study Group meeting, Camp Ripley, Minnesota.

First Name	Last Name	Agency/Affiliation	Email
Rob	Blair	University of Minnesota Extension	blairrb@umn.edu
Ryan	Boyer	National Wild Turkey Federation	rboyer@nwtf.net
John	Burk	National Wild Turkey Federation	jburk@nwtf.net
Michelle	Carstensen	Minnesota Department of Natural Resources	michelle.carstensen@state.mn.us
Joe	Caudell	Indiana Department of Natural Resources	jcaudell@dnr.in.gov
Jim	Coffey	Iowa Department of Natural Resources	james.coffey@dnr.iowa.gov
Jon	Cook	Michigan State University	cookjo15@msu.edu
Lou	Cornicelli	Minnesota Department of Natural Resources	lou.cornicelli@state.mn.us
Joanne	Crawford	Michigan State University/Midwest Wild Turkey Consortium	crawford.joanne@gmail.com
Zak	Danks	Kentucky Department of Fish & Wildlife Resources	zak.danks@ky.gov
Nicole	Davros	Minnesota Department of Natural Resources	nicole.davros@state.mn.us
Doug	Dufford	Illinois Department of Natural Resources	Doug.Dufford@Illinois.gov
Kent	Fricke	Kansas Department of Wildlife, Parks & Tourism	kent.fricke@ks.gov
Dale	Garner	Midwest Association of Fish & Wildlife Agencies	dale.garner@dnr.iowa.gov
Luke	Garver	Illinois Department of Natural Resources	luke.garver@illinois.gov
R.J.	Gross	North Dakota Game & Fish Department	ragross@nd.gov
Tyler	Harms	Iowa Department of Natural Resources	tyler.harms@dnr.iowa.gov
Brian	Haroldson	Minnesota Department of Natural Resources	brian.haroldson@state.mn.us
Mark	Hatfield	National Wild Turkey Federation	mhatfield@nwtf.net
Rick	Horton	National Wild Turkey Federation	rhorton@nwtf.net
Will	Inselman	Nebraska Game & Parks Commission	will.inselman@nebraska.gov
Levi	Jaster	Kansas Department of Wildlife, Parks & Tourism	levi.jaster@ks.gov
Chris	Jennelle	Minnesota Department of Natural Resources	christopher.jennelle@state.mn.us
Bill	Jensen	North Dakota Game & Fish Department	bjensen@nd.gov
Dan	Kaminski	Iowa Department of Natural Resources	dan.kaminski@dnr.iowa.gov
Andy	Lindbloom	South Dakota Department of Game, Fish & Parks	andy.lindbloom@state.sd.us
Jason	Lupardus	National Wild Turkey Federation	jlupardus@nwtf.net
Jeff	Lusk	Nebraska Game & Parks Commission	jeff.lusk@nebraska.gov
Keith	McCaffery	Wisconsin Department of Natural Resources	keith.mccaffery@wisconsin.gov
Clint	McCoy	Ohio Department of Natural Resources	john.mccoy@dnr.state.oh.us
Leslie	McInenly	Minnesota Department of Natural Resources	leslie.mcinenly@state.mn.us
Lindsey	Messinger	Minnesota Department of Natural Resources	lindsey.messinger@state.mn.us
Tom	Micetich	Illinois Department of Natural Resources	tom.micetich@illinois.gov
Pat	Molini	Nebraska Game & Parks Commission	pat.molini@nebraska.gov
Andrew	Norton	Minnesota Department of Natural Resources	andrew.norton@state.mn.us
Tyler	Obermoller	Minnesota Department of Natural Resources	tyler.obermoller@state.mn.us

ATTENDEES (Continued)

List of participants: 2018 Midwest Deer & Wild Turkey Study Group meeting, Camp Ripley, Minnesota.

First Name	Last Name	Agency/Affiliation	Email
Chris	Pollentier	Wisconsin Department of Natural Resources	christopher.pollentier@wisconsin.gov
Bryan	Richards	USGS National Wildlife Health Center	brichards@usgs.gov
Curt	Rollman	Wisconsin Department of Natural Resources	curtis.rollman@wisconsin.gov
Matt	Ross	Quality Deer Management Association	mross@qdma.com
Paul	Shelton	Illinois Department of Natural Resources	paul.shelton@illinois.gov
Jennifer	Stenglein	Wisconsin Department of Natural Resources	jennifer.stenglein@wisconsin.gov
Dan	Storm	Wisconsin Department of Natural Resources	danielj.storm@wisconsin.gov
Robert	Swihart	Purdue University	rswihart@purdue.edu
Ryan	Tebo	Minnesota Department of Natural Resources	ryan.tebo@state.mn.us
Erik	Thorson	Minnesota Department of Natural Resources	erik.thorson@state.mn.us
Mark	Wiley	Ohio Department of Natural Resources	mark.wiley@dnr.state.oh.us
Kevyn	Wiskirchen	Missouri Department of Conservation	kevyn.wiskirchen@mdc.mo.gov
David	Yancy	Kentucky Department of Fish & Wildlife Resources	david.yancy@ky.gov
Brian	Zielinski	National Wild Turkey Federation	bzielinski@nwtf.net
Bob	Zink	University of Nebraska-Lincoln	rzink2@unl.edu

PREVIOUS MIDWEST DEER & WILD TURKEY GROUP MEETING LOCATIONS

Year	State	Location	Date
1977	Missouri	Missouri Fountain Grove Wildlife Area	January 17-19
1978	Wisconsin	Wisconsin Wyalusing State Park	January 16-17
1979	Iowa	Iowa Rathburn Fish Hatchery	January 15-18
1980	Minnesota	Minnesota Whitewater State Park	January 21-24
1981	Indiana	Indiana Harrison-Crawford State Park	January 19-22
1982	Ohio	Ohio Lake Hope State Park	January 18-21
1983	Nebraska	Nebraska Louisbille 4-H Camp	January 17-21
1984	Kansas	Kansas Camp Aldrich	January 16-19
1985	South Dakota	South Dakota Black Hills	May 7-10
1986	North Dakota	North Dakota Camp-of-the-Cross	January 20-23
1987	Michigan	Michigan Kellogg Biological Station	January 27-29
1988	Illinois	Illinois Touch of Nature	February 1-4
1989	Missouri	Missouri YMCA Camp of the Ozarks	January 23-26
1990	Wisconsin	Wisconsin Bethel Horizons Prairie Center	January 15-18
1991	Iowa	Iowa Conservation Education Center	January 14-17
1992	Minnesota	Minnesota Whitewater State Park	January 13-16
1993	Indiana	Indiana Harrison-Crawford State Park	January 11-14
1994	Ohio	Ohio Canter's Cave 4-H Park	January 30-February 2
1995	Nebraska	Nebraska Mahoney State Park	January 15-18
1996	Kansas	Kansas Camp Pecusa	January 14-16
1997	South Dakota	South Dakota Camp NeSoDak	August 24-27
1998	North Dakota	North Dakota Camp Grafton	August 9-12
1999	Ontario	Ontario Blue Springs Scout Reserve	August 15-18
2000	Michigan	Michigan Thunder Bay Resort	August 20-23
2001	Illinois	Illinois Dixon Springs Ag. Station	August 19-22
2002	Missouri	Missouri Conception Abbey	August 18-21
2003	Wisconsin	Wisconsin Bethel Horizons Prairie Center	August 24-27
2004	Iowa	Iowa Conservation Education Center	August 22-25
2005	Minnesota	Minnesota Eagle Bluff Envir. Learning Center	August 21-24
2006	Indiana	Indiana Camp Ransburg, BSA	August 20-23
2007	Ohio	Ohio Canter's Cave 4-H Park	August 19-22
2008	Nebraska	Nebraska Fort Robinson State Park	September 14-17
2009	Kansas	Kansas Rock Springs 4-H Camp	September 14-17
2010	North Dakota	North Dakota Camp Grafton	August 22-25
2011	Michigan	Michigan Ralph A. MacMullen Center	September 25-28
2012	South Dakota	South Dakota Custer State Park	October 16-19
2013	Illinois	Illinois Allerton Park	August 18-21
2014	Missouri	Missouri YMCA Camp of the Ozarks	September 9-12

PREVIOUS MEETINGS (Continued)

2015	Wisconsin	Wisconsin Perlstein Conference Center	September 8-11
2016	Kentucky	General Butler State Resort Park	August 22-25
2017	Iowa	Honey Creek State Park Resort	August 28-31
2018	Minnesota	Camp Ripley	August 27-30