

# **2010 PROGRAM ABSTRACTS**

**Listed in Order of Presentation**

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## **INTEGRATING TECHNOLOGY INTO A PEN AND PAPER WORLD**

Chris Marsh, South Department of Game, Fish & Parks

The great thing about Pen and Paper is that everyone should know how to use it; the one downfall is how you get that information into the 21<sup>st</sup> century technology. Currently pen and paper dominate the GFP data collection process, whether it is Game Harvest surveys sent out to the public, Pheasant brood route surveys ran by department staff, to Creel surveys conducted by seasonal staff at boat ramps and small lakes and dams. Everything is written on pen and paper and later transcribed into a digital format later to be processed. Is there an easier way to skip this transcribing process and conduct surveys digitally? Ten years ago the answer would have been yes, but it is too expensive, the learning curve is steep and there are a large number of what ifs. But history has shown that technology is expensive when it is new, but gets drastically cheaper as it evolves into a better product. People in general are using technology in everyday life; cell phones, computers, etc. So we find ourselves at a time where we can begin to look for ways to reduce the use of pen and paper and use the technology to enter that information directly into a format that can be used to analyze immediately at a cost that is easier to deal with. We will be exploring how GFP is moving in this direction; successes and failures.

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## **WILDLIFE DNA FORENSICS**

Scott Mikkelson, South Dakota Department of Game, Fish & Parks

In the past few years the use of DNA analysis has become an important tool in Wildlife Law Enforcement. The use of DNA analysis has allowed for the apprehension and prosecution of subjects who violate South Dakota's wildlife laws, who in the past may have escaped being held accountable for their actions. South Dakota's Wildlife Conservation Officers now have a tool available to match evidence from kill sites to evidence found in subject's possession. DNA analysis has been used in South Dakota in the investigation of cases involving fish, furbearers and big game and will continue to be an important tool in the Wildlife Law Enforcement tool box.

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## **A HISTORICAL PERSPECTIVE AND THE FUTURE OF RADIO TELEMTRY TECHNOLOGY IN WILDLIFE STEWARDSHP**

Chris Kochanny, Sirtrack Limited

No Abstract Submitted

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## **CROSSOVER APPLICATIONS FROM WILDFIRE TO WILDLIFE**

Jim Strain and Jay Wickham, South Dakota Wildland Fire

This presentation will give a brief overview of the latest technological developments that are used by wildland firefighters in the management of wildfire and wildfire use in a field and office setting. Particular focus is given to prescribed fire use applications for use in wildlife

management and the latest innovations in wildfire suppression technology that lessens the impact of suppression activities on aquatic and terrestrial wildlife resources.

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### **APPLYING GEOSPATIAL TECHNOLOGIES TO STUDY CONNECTIONS BETWEEN WILDLIFE AND HUMAN HEALTH**

Mike Wimberly, South Dakota State University

The threat of emerging infectious diseases has come to the forefront as an important concern in the fields of human and veterinary medicine as well as wildlife conservation. Emerging infectious diseases are diseases that have recently appeared for the first time, are rapidly increasing in prevalence, or are expanding into new geographic areas. Many of these diseases involve zoonotic pathogens that cause infections in animals and are also transmissible to humans. Thus, disease emergence can be influenced by climate change, habitat loss, and other ecological factors that affect populations of host and vector species. Geographic information systems, satellite remote sensing, and related geospatial technologies can be applied to study the landscape ecology of diseases and to predict disease risk in space and time. For example, the tick-borne pathogens *Ehrlichia chaffeensis* and *Anaplasma phagocytophilum* utilize both white-tailed deer and a variety of small mammals as reservoir hosts. The distributions of these pathogens in the southeastern United States are associated with regional patterns of climate, land cover, and deer density. These relationships have been used to develop regional maps of pathogen endemicity. Similarly, West Nile virus uses a variety of bird species as reservoir hosts. Regional patterns of human WNV incidence in the Northern Great Plains are related to regional patterns of climate and land cover/land use, which are hypothesized to affect habitat suitability of both vectors and hosts. More collaborative research involving both wildlife disease ecologists and spatial modelers will be necessary to increase our understanding of infectious disease macroecology and to develop improved approaches for disease risk mapping and forecasting.

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### **EROS: A SOURCE OF DATA AND COLLABORATION FOR WILDLIFE BIOLOGISTS**

Bob Klaver, USGS-EROS

No Abstract Submitted

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### **CLIMATE CHANGE, PRAIRIE WETLANDS, AND DUCKS: WHERE WEST MEETS EAST**

Carter Johnson, South Dakota State University

Climate-warming simulations using the new simulation model WETLANDSCAPE (WLS), just published in *BioScience* 60(2):128-140, project major reductions in water volume, shortening of hydroperiods, and less dynamic vegetation for prairie wetland complexes. The WLS model portrays the future Prairie Pothole Region (PPR) as a much less resilient ecosystem: the western PPR may be too dry and the eastern PPR may have too few functional wetlands and nesting habitat to support historic levels of ducks and other wetland-dependent species. Maintaining

ecosystem goods and services at 20<sup>th</sup> century levels in a 21<sup>st</sup> century climate will be a major challenge for the conservation community.

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## **SURVIVAL, REPRODUCTION, HOME RANGE, AND HABITAT USE OF TRANSLOCATED EASTERN WILD TURKEYS IN THE WESSINGTON HILLS, SOUTH DAKOTA**

Chad Switzer, South Dakota Department of Game, Fish & Parks

The South Dakota Department of Game, Fish & Parks continues to explore opportunities to use available landscapes which may provide suitable habitats for sustaining wild turkey populations. To address questions and provide management implications for wildlife managers on less than desirable turkey habitat, we monitored translocated eastern wild turkeys (*Meleagris gallopavo*) released onto an isolated, minimally forested area in an agricultural landscape devoid of a river system in eastern South Dakota.

We fitted 47 female turkeys with radio transmitters and collected 4,161 relocations to evaluate survival, reproduction, home range, and habitat use from 2006-2008. Annual female survival ranged from 0.45-0.55, with no significant difference among years. We documented 39 females turkeys initiating 49 nests, with 10 of those being second attempts. First and second nest attempts were 30% and 60% successful in hatching  $\geq 1$  egg, respectively. For all nest attempts (n=49) and years combined, the mean dispersal from release location to nest site was 3.6 km. Estimated brood survival up to 4 weeks of age was 0.75, 0.00, and 0.40 in 2006, 2007, and 2008, respectively. We found a significant difference in home range size among season, where post-breeding home ranges were less than half the size of breeding home ranges and 34% smaller than winter home ranges. Standardized selection ratios revealed that woodlands were used 4.4 and 3.1 times more than random selection would predict at the landscape and local scales, respectively. In addition, we found that <1% of the total area within all buffered relocations included farmstead habitat.

Home ranges within our study area included 14% woodland habitat. Potential translocation sites characterized by minimally forested sites in agricultural landscapes in eastern South Dakota should contain at least 20% woodland habitat, with as much connectivity among woodland habitats as possible. The inclusion of perennial streams and wooded tributaries associated with riverine systems in eastern South Dakota, along with nesting and brood-rearing habitat provided by CRP and other grassland habitat, could enhance the success of future wild turkey translocation projects. Based upon the avoidance of farmsteads by turkeys in this study, we recommend wildlife managers to consider eastern wild turkeys for future transplants into marginal, unoccupied turkey habitat in eastern South Dakota. While these translocated turkeys were sustaining a local population, we observed no significant expansion in range or population density during our study.

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## **2009 BLACK HILLS OWL SURVEYS**

Nancy Drilling, Rocky Mountain Bird Observatory

Owls are among the least known group of birds in the Black Hills. Surveys specifically targeting owls are the best way to truly understand the status and distribution of owls. The goal of this study was better understand owl status and distribution in the South Dakota portion of the Black Hills by undertaking special owl surveys during March, April and early May, 2009. Owls were

surveyed at 165 roadside points, each point ½ mile apart along 14 different routes within breeding bird atlas blocks using recorded calls.

Contrary to previous reports, we found that Northern Saw-whet Owl (*Aegolius acadicus*) is by far the most common and widespread species, detected at 15% of all survey points and 93% of all routes, and at all elevations and in all months. Great Horned Owl (*Bubo virginianus*) was relatively uncommon but widespread, detected at 7% of all points and 47% of all routes. A small group of Long-eared Owls (*Asio otus*) was detected in March in the Pringle-Custer area but not relocated in April or May, suggesting wintering birds. Only four Eastern Screech-owls (*Otus asio*) were detected, all in lower elevation riparian zones, as expected.

Data collected during this survey contributed greatly to our knowledge of Black Hills owls and will be used as part of the second South Dakota Breeding Bird Atlas. However, one atlas block and 49 points were not surveyed and another 103 points were surveyed only one time. These should be surveyed again to ensure that no species goes undetected. Other recommendations include establishing a high-elevation spruce habitat survey route to target Boreal Owls (*Aegolius funereus*), conducting targeted Flammulated Owl (*Otus flammeolus*) surveys in June, and working to gain access to high elevation survey points in March and April.

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## **THE FUTURE OF WATERFOWL HUNTING IN SOUTH DAKOTA**

Larry Gigliotti, South Dakota Department of Game, Fish & Parks

While the numbers of South Dakota resident, licensed small game hunters has been relatively constant over the past decade, South Dakota has registered about a 45% decrease in resident waterfowl hunters from 2001 to 2008. In addition, other states have also noticed similar declining participation in waterfowl hunting. Such a significant decrease in waterfowl hunting participation has raised concerns about the future of waterfowl hunting. In response, South Dakota Game, Fish and Parks conducted two extensive surveys of resident hunters based on the 2008 license sales database. One survey (referred to as the Bird Hunter Survey) was of resident, licensed adult small game hunters that did NOT purchase the Migratory Bird Certification, which is required to hunt waterfowl in South Dakota. The other survey (referred to as the Waterfowl Hunter Survey) was of resident, licensed adult small game hunters that DID purchase the Migratory Bird Certification. The purpose of these surveys were to study the issue in hopes of finding steps a wildlife agency can take to reverse the trend of declining waterfowl participation. This presentation will provide some of the findings that shed light on declining waterfowl participation in South Dakota.

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## **MANAGING RESOURCES IN MOUNTAIN PINE BEETLE DISTURBED HABITATS**

Gary Brundige, South Dakota Department of Game, Fish & Parks

Mountain pine beetles (*Dendroctonus ponderosae*) are an endemic beetle to the Black Hills of South Dakota. The Black Hills have been experiencing an epidemic outbreak of mountain pine beetle (MPB), with the current outbreak beginning in the late 1990's. One epicenter of activity in the Black Elk Wilderness (BEW) continues to pressure the Sylvan Lake area of Custer State Park (CSP). Beetle populations are at unprecedented levels in infested areas with high mortality of ponderosa pine (*Pinus ponderosa*) and non-target tree species also being attacked. CSP in cooperation with South Dakota Department of Agriculture began treatments in the Sylvan Lake area in 2005 in an attempt to control population expansion and to protect timber resources. CSP

is home to a unique small remnant population of limber pine (*Pinus flexilis*), a species preferred by MPB in other areas. CSP has employed a number of techniques to control beetle movements, limit population growth and protect resources. These include trapping, the use of aggregate pheromone baits, anti-aggregate pheromone to protect valuable trees and stands, and the felling and cutting of over 40,000 infested trees to induce mortality on larvae. Additionally, the park created 450 ac of buffer thinnings to reduce movement of MPB from the heavily infested BEW. Beginning November 2009, CSP employed heli-logging to remove infested trees on 2,250 acres. Concurrently, a timber sale reduced stand densities on 650 additional acres. Treated areas will have significantly lower stand densities than pre-treatment. However, mortality of up to 100% of ponderosa pine in adjacent expanses of the BEW has effectively eliminated those pine habitats for several decades. Habitat diversity in treated areas will be enhanced with pine, aspen and spruce stands interspersed. Relatively low density mature pine stands will return to higher densities with a mature to over-mature overstory in the relative near term.

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## **MAPPING BIG SAGEBRUSH VEGETATION IN NORTHWESTERN SOUTH DAKOTA**

Dave Ode and Chris Marsh, South Dakota Department of Game, Fish & Parks

In 2006, the South Dakota Game, Fish and Parks Department contracted with the Bureau of Reclamation's Remote Sensing and Geographic Information Technical Center in Denver to map big sagebrush vegetation in western South Dakota. Color infrared digital imagery at a scale equivalent to 1 square foot pixel size was flown in fall 2006 of a 1.35 million acre area of western SD where a majority of the big sagebrush occurs. A two step process was used to interpret and classify the imagery, first using unsupervised, automated segmentation software called eCognition, followed by visual editing. Ground-level vegetation characteristics from previous studies were used to "train" the eCognition software and to help interpret and classify the imagery. The second step involved visual inspection and correction of delineations. Because of financial constraints, only the computer delineated polygons on public lands were visually inspected and corrected resulting in a partial coverage of about 13,000 polygons representing 166,000 acres of sagebrush vegetation occurring on public lands of northwestern SD. Further modeling and field work will be needed to complete the statewide mapping effort; however two reports summarize accomplishments thus far:

Wright, Patrick and Dave Wegner. 2007. Mapping sagebrush for sage grouse habitat in Butte and Harding Counties, South Dakota. Technical Memorandum No. 86-68260-08-01, Remote Sensing and GIS Group, Technical Service Center, Bureau of Reclamation, Denver, CO. 35 pp.

Dan Cogan & Dave Ode. 2005. South Dakota Big Sagebrush Mapping Project, Research Report and Mapping Proposal for: Fall River, Butte, and Harding Counties. Technical Memorandum 8260-06-01.

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## **MONITORING BLACK-TAILED PRAIRIE DOG ACREAGE AND DISTRIBUTION IN SOUTH DAKOTA USING GIS**

Silka Kempema, South Dakota Department of Game, Fish & Parks

The petition to list the black-tailed prairie dog (*Cynomys ludovicianus*) under the Endangered Species Act initiated a range-wide effort to improve or initiate efforts to better monitor the species. Various methods are used among states within the species' range. Since 2003, the State

of South Dakota has evaluated and modified its monitoring methodology. In 2008, the Department of Game, Fish, and Parks used a Geographic Information System to monitor the acreage and distribution of black-tailed prairie dogs in the state using photograph interpretation, ground-truthing, and data sharing. Approximately 630,849 colony acres (255,296 hectares) were documented in 2008. Despite its utility, I'll discuss some of the challenges regarding the use of aerial photograph interpretation to determine acreage and distribution of this species of prairie dog.

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## **SPATIAL RESOURCE USE BY BLACK-BACKED WOODPECKERS IN RECENTLY BURNED FOREST AND MOUNTAIN PINE BEETLE INFESTATIONS IN THE BLACK HILLS, SD**

Mark A. Rumble<sup>1</sup>, Christopher Rota<sup>2</sup>, Chad P. Lehman<sup>3</sup>, Dylan Kesler<sup>2</sup>, Thomas W. Bonnot<sup>2</sup>, Joshua Millsbaugh<sup>2</sup>.

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<sup>2</sup> Department of Fisheries and Wildlife, University of Missouri, Columbia, MO

<sup>3</sup> South Dakota Department of Game Fish and Parks, Custer State Park, Custer, SD

Black-backed woodpeckers (*Picoides arcticus*; BBWO) are uncommon residents in the Black Hills. In South Dakota, Game, Fish and Parks lists them as locally rare and vulnerable to extinction. Consequently, BBWOs are a Species of Greatest Concern in the Black Hills Ecoregion. The Forest Service lists BBWOs as Sensitive Species; a species for which management should not lead to population declines that could lead to potential listing under the Endangered Species Act. BBWOs are considered post-fire obligates, but earlier research (Bonnot et al. 2008) demonstrated sustainable populations in areas impacted by mountain pine beetles (*Dendroctonus ponderosae*; MPB). Knowledge of resource selection in the context of altered fire regimes and forest management is lacking.

Our study included the Box Elder fire near Nemo, SD, the Four-mile fire in Custer State Park; both of which burned during summer of 2007, and MPB infested areas south of Deerfield Lake. We captured and marked 123 BBWOs, 111 birds of which we placed radio transmitters. We estimated 95% MCP home ranges for 36 birds with >30 locations during the 2008 and 2009 breeding seasons. We also combined nesting data from Bonnot et al. (2008) with the present study to evaluate the relationship between nest initiation dates and elevation. BBWO breeding home ranges were similar ( $P \leq 0.32$ ) between years and home ranges in post-fire areas were smaller ( $P \leq 0.01$ ) than in MPB infested areas. There was weak evidence that BBWOs in the Box Elder and Four-mile burns incorporate greater amounts of unburned forest in home ranges two years post-fire ( $P \leq 0.18$ ). There was a significant, but weak positive correlation between altitude and nest initiation date. Given, the movements by BBWOs in the Black Hills, they appear to be responding to localized cues for nesting. We have witnessed several long-distance movements, with several observed movements of >40km.

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## **MOVEMENTS OF ELK RELATIVE TO MANAGEMENT UNIT BOUNDARIES IN THE BLACK HILLS, SOUTH DAKOTA**

Lowell Schmitz, South Dakota Department of Game, Fish & Parks

We captured and radio collared one hundred and five elk (*Cervus elaphus*) in the Black Hills of South Dakota. Elk were fitted with three types of collars, standard VHF, store-on-board GPS and

live uplink GPS. The objectives for this research were to: 1) determine seasonal movements of elk relative to management unit boundaries; 2) identify movement corridors; and 3) document cause specific mortality. Preliminary results have shown collared elk to utilize more than one hunting unit during the hunting seasons. To date approximately 4000 locations have been taken to identify corridors and movements across and within units. Greatest linear distance traveled by a collared elk so far was 21 miles. Greatest linear distance recorded in 24 hours was 9.2 miles. As of 1 February 2010 33 collared elk are still being monitored. These 33 elk consist of 1 live uplink collar, 2 store-on-board GPS collars, and 30 standard VHF collars. Minimum total mortality for the first three years of this study has been 63%. Mortality among bulls was 68% and 60% for cows. Hunters have accounted for 77% of the mortalities (66% harvest, 11% wounding loss) and predation accounted for a minimum of 11%.

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## **A COORDINATED APPROACH TO THE MANAGEMENT OF INVASIVE SPECIES IN SOUTH DAKOTA**

Scott Guffey, South Dakota Invasive Species Management Association

The South Dakota Invasive Species Management Association was formed with the intent of a progressive endeavor to bring together concerned landowners, citizens and agencies with a common vision and unity to address all of South Dakota's invasive species management challenges. Association membership is open and inclusive to anyone, and is broken into twelve broadly established categories of membership. We hope to appeal to private landowners, county commissioners and state legislators, county weed & pest boards/supervisors, federal and state agencies, universities, industry and commercial applicators, non-government organizations, and the public at large.

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## **FECAL NITROGEN AS AN INDEX TO DIET QUALITY: SEX-SPECIFIC EFFECTS**

K. B. Monteith<sup>1</sup>, K. L. Monteith<sup>2</sup>, J. A. Jenks<sup>1</sup>, R. T. Bowyer<sup>2</sup>, and D. M. Leslie, Jr.<sup>3</sup>

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Concentration of fecal nitrogen has been used widely as an indicator of forage quality for free-ranging ruminants; however, potential weaknesses in this index have been reported. Differences in digestive function between species could negate use of interspecific comparisons of fecal nitrogen. Moreover, marked differences in digestive function between sexes within a particular species may bias fecal nitrogen as an index to diet quality. Our objective was to evaluate the influence of sex and reproductive status on concentration of fecal nitrogen. Male, nonreproductive female, and reproductive female white-tailed deer were fed an *ad libitum* diet of corn and pelleted soyhulls, and a restricted diet where corn was offered at 40% of *ad libitum* intake. We collected feces twice daily from May to October 2008 and 2009. We combined weekly samples per individual and dried, ground, and processed samples using Micro Kjeldahl procedures to determine percent nitrogen. Fecal nitrogen reflected diet quality because deer on the restricted diet had lower percent fecal nitrogen compared with the *ad libitum* diet. During gestation, mean fecal nitrogen of reproductive females was similar to that of males and nonreproductive females on comparable diets. During lactation, however, fecal nitrogen of

reproductive females in both diet groups was lower ( $P < 0.05$ ) than males or nonreproductive females and remained low throughout lactation. We hypothesize that investment in digestive tissue by reproductive females may enhance their ability to extract nitrogen during lactation. Increased efficiency in absorption of nitrogen may increase nutrients available for maintenance of somatic tissue and milk production. We discuss the consequences of a potential bias in fecal nitrogen as an index to dietary quality during lactation.

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## **AN EVALUATION OF NESTING AND FLEDGING SUCCESS FOR SIX SPECIES OF COLONIAL TREE-NESTING WATERBIRDS IN NORTHEAST SOUTH DAKOTA**

Nathaniel J. Baker,<sup>1</sup> Charles D. Dieter,<sup>1</sup> Kristel K. Bakker<sup>2</sup>

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The northern Great Plains of North America provides the primary breeding habitat for numerous species of waterbirds. Reproductive status and population parameters of colonial tree-nesting waterbirds are largely unknown within the prairie pothole region. We monitored nesting success of: Black-crowned Night Heron (*Nycticorax nycticorax*), Cattle Egret (*Bubulcus ibis*), Double-crested Cormorant (*Phalacrocorax auritus*), Great Blue Heron, (*Ardea herodias*), Great Egret (*A. alba*), and Snowy Egret (*Egretta thula*) during the 2008 and 2009 breeding seasons on selected wetlands in northeast South Dakota. Objectives were to determine nesting and fledging success, and identify important habitat characteristics required for colonial tree-nesting waterbirds. We hypothesized that nesting success would increase with colony size, percent water edge, and wetland density (within a 6400 m radius), and be inversely related to human disturbances. Colonies were visited once every six - eight days throughout the 2008 (n=28) and 2009 (n=25) breeding seasons, 14 of which were monitored in both years. A total of 1174 and 1376 individual nests were observed in 2008 and 2009, respectively, with a 20-60x82 spotting scope at a distance of 150 m away to mitigate observer disturbance. Nest success was analyzed using the apparent nest success estimator. Percent nest success for 2008 and 2009 were: Black-crowned Night Heron (50.0, 53.1), Cattle Egret (88.9, 61.0), Double-crested Cormorant (62.1, 78.7), Great Blue Heron (41.7, 68.63), Great Egret (46.6, 69.8), and Snowy Egret (88.0, 80.56). Determining reproductive success and habitat parameters of colonial tree-nesting waterbirds are essential to understanding trends in population breeding biology.

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## **AN EVALUATION OF DUCK AND RING-NECKED PHEASANT NEST SURVIVAL AND NEST DENSITY IN RELATION TO PATCH SIZE AND LANDSCAPE LEVEL VARIABLES IN EASTERN SOUTH DAKOTA**

Keith J. Fisk, K.K. Bakker, K.C. Jensen, and R. Klaver

Grassland ecosystems in South Dakota have experienced significant transformations over the last 100 years. Landscapes are currently dominated by large agricultural fields interspersed with small, isolated grassland patches. These isolated grassland patches are thought to experience decreased nest survival rates for Ring-necked pheasants (*Phasianus colchicus*) and duck species, because of small size and high degrees of fragmentation. Several natural resource agencies currently conserve grasslands throughout eastern South Dakota, but wildlife managers seek more information on how successful these conservation strategies are. Therefore, the objectives of this study were to: (1) evaluate the relationship of duck and pheasant nest survival and nest density between different grassland patch sizes, (2) evaluate the effects of woody cover (i.e., shelterbelts)

on duck and pheasant nest survival and nest density, and (3) evaluate how landscape composition and the spatial arrangement of landscape features affects duck and pheasant nest survival and nest density in eastern South Dakota. Most duck species exhibited increased nest survival in landscapes with large amounts of grasslands and wetlands. Whereas, ring-necked pheasant nest survival was negatively affected by the proportion of farmsteads and cropland within surrounding landscapes. Patch size and the presence of woody cover were weakly supported in nest survival models for most species. Patch size, grassland area, and wetland area within the surrounding landscape increased nest densities of most species. Therefore, wildlife managers need to consider landscape composition when determining locations to implement habitat conservation strategies that are intended to maximize pheasant and duck production.

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### **GOBBLER MORTALITY IN THE NORTHERN BLACK HILLS OF SOUTH DAKOTA**

Tom Berdan, Department of Wildlife and Fisheries Sciences, South Dakota State University, Brookings, SD 57007, USA.

Due to increasing population trends of the Merriam's wild turkey (*Meleagris gallopavo merriami*) and unlimited license availability, the Black Hills of western South Dakota has become a popular destination for spring turkey hunters. Recent trend data indicates increasing spring hunting pressure and has led to questions of over-harvest of adult male turkeys in the Black Hills. To address these concerns, I have completed a study to determine survival of Merriam's turkeys in the northern Black Hills, SD. Adult and juvenile male Merriam's wild turkeys (n = 137) were captured and radio-marked during January and February of 2008 and 2009. Marked turkeys were monitored 2-4 times per week through the end of May in 2008 and 2009.

Annual survival rates differed between years and among age classes. Adult males had a lower annual survival rate than juvenile males. Seasonal survival estimates were calculated in Program MARK using known fate models. Estimates were based on a 14-week period for each year. 2008 juveniles  $\hat{S} = 0.6899$ ; 2008 adults  $\hat{S} = 0.6567$ ; 2009 juveniles  $\hat{S} = 0.7247$ ; 2009 adults 0.6413.

Mortality sources during this study included hunting (both spring and fall), predation, wounding, weather-related, vehicle collision and unknown sources. Spring hunter harvest was the primary mortality factor in the northern Black Hills (32%), fall harvest accounted for 5% and an additional 5% for wounding mortalities as well. Avian predation accounted for 9% while mammalian predation comprised 5% of total mortality. One juvenile (1%) male was struck by a vehicle, and 12% died as a result of severe late winter/early spring blizzards. Twenty-one percent of mortalities were classified as unknown.

My research shows that under the current licensing system, spring harvest rates for wild male turkeys in the northern Black Hills are not high enough to significantly alter the male population or age structure. However, years with numerous severe winter weather events followed by mild spring weather conditions, harvest could potentially begin to alter the male population and age structure.

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### **INFLUENCE OF LANDSCAPE CHARACTERISTICS ON MIGRATION STRATEGIES OF WHITE-TAILED DEER**

Troy W. Grovenburg<sup>1</sup>, Christopher N. Jacques<sup>2</sup>, Robert W. Klaver<sup>3</sup>, Christopher S. DePerno<sup>4</sup>, Todd J. Brinkman<sup>5</sup>, Christopher C. Swanson<sup>1</sup>, and Jonathan A. Jenks<sup>1</sup>

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<sup>3</sup>U. S. Geological Survey Center for Earth Resources Observation and Science (EROS), 47914 252<sup>nd</sup> Street, Sioux Falls, SD

<sup>4</sup>Department of Forestry and Environmental Resources, North Carolina State University, Raleigh, NC

<sup>5</sup>Institute of Arctic Biology & Department of Biology and Wildlife, University of Alaska Fairbanks, Fairbanks, AK

Migration strategies (i.e., obligate, conditional, resident) of white-tailed deer (*Odocoileus virginianus*) vary and influence population dynamics. From 2000–2007, we captured 267 adult female deer at 7 study sites in Minnesota and South Dakota and monitored 149 individuals through  $\geq 3$  seasonal migration periods (585 deer-migration seasons). We used landscape metrics to assess their importance relative to probability of migration of deer. We hypothesized that forested cover would influence migration classification and that winter severity would influence initiation of migration for conditional migrants. Areas inhabited by resident deer were characterized by greater number of forest patches/100 ha ( $\square = 3.5$ , SE = 0.3), larger mean forest patch area ( $\square = 10.1$  ha, SE = 1.6), and more forest edge ( $\square = 1.3$ , SE = 0.1) than conditional and obligate migrant areas. Multinomial logistic odds ratios indicated a 43.8 and 36.4% increased probability of obligate migration for every 1 unit decrease in forest patch density and 1 ha decrease in forest mean area, respectively, compared to resident deer; probability of obligate migration decreased 15.8% for every 0.1 unit increase in forest shape index. Odds ratios indicated a 25.0 and 42.3% increased probability of conditional migration for every 1 unit decrease in forest patch density and 1 ha decrease in forest mean area, respectively, compared to resident deer; probability of conditional migration decreased 27.2% for every 0.1 unit increase in forest shape index. Probability of migration for conditional migrants increased by 9.4% for every 1 point increase in deer winter severity index. Landscape characteristics provided predictive indicators of migration strategies for deer. Use of environmental and landscape metrics to predict obligate and conditional migration probabilities and migration distances has important implications for predicting movement of deer relative to management unit boundaries.

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## **ESTIMATING FORAGE PRODUCTION FOR WATERBIRDS AND WATERBIRD RESPONSES TO HABITAT MANAGEMENT AT LACREEK NATIONAL WILDLIFE REFUGE**

Heather McWilliams<sup>1</sup>, K.C. Jensen<sup>1</sup>

<sup>1</sup>Department of Wildlife and Fisheries Sciences, South Dakota State University, Brookings, SD

The Lacreek National Wildlife Refuge (hereafter Refuge) wetland system provides critical forage and cover for migratory and breeding waterbirds in western South Dakota, including waterfowl, shorebirds, and secretive marsh birds. The Refuge also acts as the primary wintering grounds to over half of the High Plains population of trumpeter swans (*Cygnus buccinator*).

This study will provide information required to quantify forage production in managed wetland habitats and assess waterbird responses to current management protocols. The information collected is vital for the development of a habitat management plan for the Refuge as well as assessing whether the Refuge is providing adequate food resources for migrating and wintering waterbirds. The objectives of this study are to (1) determine if moist-soil plant production regression models developed in Missouri are applicable in northern wildlife refuges

implementing moist-soil management practices, (2) design and create a regression model to estimate tuber biomass production in relation to arrowhead (*Sagittaria latifolia*) leaf area, (3) determine which habitat features most influence secretive marsh birds (SMB) when selecting breeding territories in northern moist-soil impoundments, and (4) determine if moist-soil management practices have a negative impact on secretive marsh bird breeding densities.

Seed estimation regression models will be collected for barnyardgrass (*Echinochloa crusgalli*), annual smartweeds (*Polygonum* spp.), and beggarticks (*Bidens* spp.). Habitat assessments will be conducted for each target marsh bird which includes the American bittern (*Botaurus lentiginosus*), sora (*Porzana carolina*), and Virginia rail (*Rallus limicola*) during the 2008 and 2009 breeding season.

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## **DEVELOPMENT OF AN ELK SIGHTABILITY MODEL FOR THE BLACK HILLS, SOUTH DAKOTA**

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Wildlife managers need reliable, cost-efficient, and repeatable methods for estimating population parameters (e.g. density, age ratios, and sex ratios) and their changes over time. However, visibility bias can cause serious underestimates of total counts when conducting aerial surveys for ungulates. The Black Hills of South Dakota are characterized by dense ponderosa pine (*Pinus ponderosa*), which affects sightability and accurate censusing of elk (*Cervus elaphus*). Few studies have evaluated aerial survey methodology for visibility bias in this region of South Dakota. We conducted elk sightability trials during January and February 2009 using a Robinson-44 helicopter with 2 observers and the pilot. We used information-theoretic methods and multivariate logistic regression to determine important factors of elk detection. From 63 sightability trials on groups containing radiocollared elk, our sightability rate was 63.5%. Data analysis revealed that percent vegetation cover ( $\sum \omega_i = 0.97$ ,  $P = 0.008$ ) and group size ( $\sum \omega_i = 0.92$ ,  $P = 0.015$ ) were the primary factors influencing elk sightability in the eastern Black Hills. However, due to low sample size, model selection uncertainty does exist. Additional data collection in 2010 will allow stronger inferences concerning variable selection during model development and a more precise model for future survey application.

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## **MICROHABITAT SELCTION AND HOME RANGE SIZE OF BOBCATS IN THE SOUTHERN BLACK HILLS OF SOUTH DAKOTA**

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Bobcats (*Lynx rufus*) inhabit a variety of landscapes across North America. Within the distribution of bobcats, habitat use at the home-range level has been well studied, particularly in forested landscapes. In contrast, few studies have evaluated microhabitat use of bobcats and no microhabitat work has been conducted in the Black Hills. Our objective was to characterize microhabitat selection and home range size of male and female bobcats in this region. A total of 9 bobcats (3 male, 6 female) were fitted with store-on-board GPS collars. Twenty variables were measured at 173 locations used by bobcats to assess (1) bobcat habitat selection (2) variation in habitat selection with male and female bobcats, and (3) home range size. Data were analyzed using a-priori modeling and logistic regression to determine the best model. Microhabitat characteristics of used sites varied from random sites ( $F_{17, 276} = 5.31$ ,  $P < 0.0001$ ). Modeling results of the pooled male and female data indicated that bobcats selected for steeper slopes, closer distance to drainages, more grass and shrub cover, bare ground, and medium vertical cover ( $w_i = 0.631$ ). Habitat selection also varied by sex ( $F_{17, 128} = 5.41$ ,  $P < 0.0001$ ). Males selected for higher elevations, where as females selected for taller grass and shrubs and greater amounts of low and total visual cover. Home range sizes were derived using Brownian Bridge estimation methods. Home range size varied by sex ( $F_{1, 7} = 8.44$ ,  $P = 0.023$ ), with males averaging 47.8 km<sup>2</sup> and females averaging 22.6 km<sup>2</sup>. While our findings are similar to work in other regions of the United States, the scale of habitat selection evaluated has furthered our knowledge of the species and provided insight as to how bobcats use the Black Hills landscape.

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#### **PRELIMINARY PLAGUE ASSAY RESULTS OF FLEAS COLLECTED FROM BLADLANDS AND WIND CAVE NATIONAL PARKS AND ON BUFFALO GAP NATIONAL GRASSLAND IN SOUTH DAKOTA**

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Sylvatic plague, the wildlife form of bubonic plague, has become prevalent in South Dakota black-tailed prairie dog colonies in the last two years. The loss of prairie dog colonies due to plague can drive the loss of other species that have close ecological ties to the colonies, including the federally endangered Black-footed ferret. South Dakota has a highly successful reintroduction program for this native predator and the spread of plague in the state threatens to extirpate black-footed ferrets from the state. An accessible and efficient detection and monitoring tool is essential to wildlife managers as they attempt to ameliorate the effects of the plague outbreak in South Dakota. Fleas were collected from burrows on prairie dog colonies across Badlands National Park, Buffalo Gap National Grassland, and Wind Cave National Park in summer 2009. Whole genomic DNA was extracted from fleas after they were identified to species. Flea DNA was tested using a highly sensitive nested polymerase chain reaction (PCR) protocol to detect the *pla* gene in the plague-causing bacterium, *Yersinia pestis*. An active outbreak of plague began on one of the colonies at Badlands National Park concurrently with our flea collections there and *Y. pestis* – positive fleas were detected from these samples for the first time in Badlands National Park. These findings may trigger management actions including ferret immunization against plague and dusting of prairie dog colonies with deltamethrine.

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#### **NEST SUCCESS OF UPLAND NESTING DUCKS AND RING-NECKED PHEASANTS IN A PREDATOR REDUCED ENVIRONMENT IN NORTHEASTERN SOUTH DAKOTA**

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Nest success is the greatest limiting factor to waterfowl production in the Prairie Pothole Region (PPR) which supports greater than 50 % of North America's breeding duck population. Depredation by predators accounts for 80% or more of nest losses each year (Klett 1988). Township size block predator management (BPM) has been effective at increasing duck nest success in North Dakota and Canada, but no BPM work has been done in South Dakota. There has also been no work looking at the effects of BPM on pheasants. South Dakota has the largest population of ring-necked pheasants in the country. The objectives of this study were to evaluate the effectiveness of increasing duck and pheasant nest success with the aid of trapping as a management tool. Trappers hired by the Delta Waterfowl Association removed mammalian predators in northeast South Dakota on two 36-square mile blocks in 2007 and 2009, and three blocks in 2008 from March 15-July 15. Trapped blocks along with a similar control block were searched for nests and monitored weekly to determine their fate. We found 2,706 duck nests and 717 pheasant nests during this study. Mayfield nest success results for ducks ranged from 16.7% to 57.8% in trapped areas and 10.2% to 61.9% in control areas. Pooled Mayfield nest success for ducks was significantly higher in trapped sites (36.5%, 95%CI - 33.4 - 39.8) than in control sites (26.5%, 95%CI - 23.8 - 29.5). Mayfield nest success for pheasants ranged from 5.0% to 39.0% in trapped areas and 4.1% to 46.2% in control areas. Pooled Mayfield nest success for pheasants had a high variance with 18.2% (95%CI, 13.4 – 24.6) for the trapped sites and 14.5% (95%CI, 10.8 – 19.3) for control sites. These results show that positive effects related to trapping in South Dakota were site and year specific.