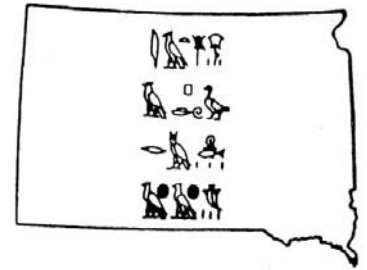




**South Dakota Chapter of The Wildlife Society
2008 Annual Meeting Program
Cedar Shore Resort & Convention Center
Oacoma, South Dakota
March 17 - 19, 2008**



Monday, March 17th

11:00 am -1:00 pm Registration and Free Lunch (lunch sponsored by the Truax Company)

1:00 pm -1:10 pm Welcome and Introductions

1:10 pm – 3:00 pm Special Session: “*Wildlife Education: Challenges and Opportunities for Preparing the Next Generation of Wildlife Professionals*” There will also be updates on current status of energy issues as they affect South Dakota’s wildlife resources, and an update on national legislative items of importance.

Session 1 - Wildlife Education and Energy Issues (KC Jensen, Moderator)

1:00 – 1:10 Opening Remarks

1:10 – 1:40 **Dr. W. Daniel Svedarsky** – President, The Wildlife Society

1:40 – 2:10 **Dr. David Willis** – SDSU Wildlife and Fisheries Sciences

2:10 – 2:30 **Ms. Laura Bies** – The Wildlife Society

2:30 – 3:00 **Mr. Steve Wegman** – South Dakota Public Utilities Commission

3:00 – 3:30 Break

3:20 – 3:40 Keeping the “Green” in Green Energy. **Jill Shaffer**

3:40 – 4:00 No Child Left Inside. **Chad R. Tussing**

4:00 – 4:20 Project WILD. **Chad R. Tussing**

4:20 – 4:30 Announcements

6:00 pm Social and Fund Raiser Auction

Tuesday, March 18th

8:30 am-12:00 pm - SDTWS Business Meeting

12:00 pm-1:00 pm - Lunch

Session 2 - Contributed papers (Dan Hubbard, Moderator)

1:00 – 1:20 Genetic Structure of Black Hills Cougars.
Jonathan A. Jenks, Daniel J. Thompson, Dorothy M. Fecske, Michael K. Schwartz, and Kristine L. Pilgrim

1:20 – 1:40 Multiple scale habitat selection by elk in a homogeneous ecosystem.
Mark A. Rumble and R. Scott Gamo

1:40 – 2:00 A resource selection habitat model for northern flying squirrels in the Black Hills of South Dakota.
Melissa Hough* and Charles D. Dieter

2:00 – 2:20 Understanding white-tailed deer productivity: population ecology of neonates.
Troy W. Grovenburg*, Jonathan A. Jenks, Robert W. Klaver, Susan P. Rupp, Christopher N. Jacques, and Michael C. Wimberly

2:20 – 2:40 White-tailed deer preference of corn hybrids during the growing season.
Joshua A. Delger*, Jonathan A. Jenks, and Kevin L. Monteith

2:40 – 3:00 **Break**

- 3:00 – 3:20 False map, spiny softshell and smooth softshell turtle nest and nest site habitat characteristics along the Missouri National Recreation River in South Dakota.
Laura A. Dixon* and Charles D. Dieter
- 3:20 – 3:40 Turtles in the 59-Mile District of the Missouri National Recreational River: Species composition, age structure, sex ratios and abundance.
Aaron J. Gregor* and David L. Swanson
- 3:40 – 4:00 River otter distribution in South Dakota.
Jacque R. Ermer and Silka Kempema
- 4:00 – 4:20 Evaluation of an augmentation of bighorn sheep at Badlands National Park, South Dakota.
Teresa J. Zimmerman*, Jonathan A. Jenks, Robert W. Klaver, David M. Leslie, Jr., Eddie Childers
- 4:20 – 4:40 Evaluation of barriers to black-tailed prairie dog (*Cynomys ludovicianus*) colony expansion, Bad River Ranches, South Dakota.
Marcus B. Gray* and Jonathan A. Jenks
- 6:00 pm - Social
7:00 pm - Awards Banquet.
Guest Speaker: **Dr. W. Daniel Svedarsky** – Integrated Wildlife Management in an Era of Sustainability

Wednesday, March 19th

Session 3

Contributed papers (Susan Rupp – Moderator)

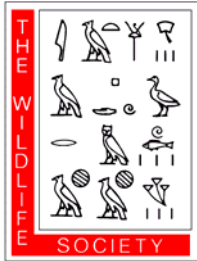
- 8:30 – 8:50 Final results of the colonial waterbird inventory project and a long-term state-wide monitoring plan.
Nancy Drilling
- 8:50 – 9:10 Influence of Conservation Reserve Program (CRP) lands and landscape attributes on the distribution and abundance of prairie grouse.
Travis J. Runia* and Kent C. Jensen
- 9:10 – 9:30 Survival and winter habitat use of greater sage-grouse in the Dakotas.
Christopher C. Swanson*, Kent C. Jensen, Mark A. Rumble, Katie M. Herman-Brunson, and Nicholas W. Kaczor.
- 9:30 – 9:50 Anthraquinone corn seed treatment (Avitec™) as a feeding repellent for ring-necked pheasants (*Phasianus colchicus*) on newly planted corn in eastern South Dakota.
Emily A. Hodne* and Daniel E. Hubbard
- 9:50 – 10:10 Introduction of Eastern Wild Turkeys into the Agricultural Landscapes of Eastern South Dakota.
Heidi M. Jacobsen* and Kent C. Jensen
- 10:10 – 10:30 - **Break**
- 10:30 – 10:50 Merriam's turkey nest survival and factors affecting nest predation by mammals.
Chadwick Lehman, Mark Rumble, Lester Flake and Daniel Thompson.
- 10:50 – 11:10 Nesting success and recruitment of greater sage-grouse in northwest South Dakota.
Nicholas W. Kaczor*, Kent C. Jensen, Katie M. Herman-Brunson, and Christopher C. Swanson, Mark A. Rumble, Robert W. Klaver, and Charles Berdan
- 11:10 – 11:30 Crop depredation during summer by Canada geese in eastern South Dakota.
Troy R. Radtke* and Charles D. Dieter
- 11:10 – 11:30 A multi-region, adaptive approach to invasive plant management on Fish and Wildlife Service-owned native prairies.
Bridgette Flanders-Wanner, Todd Grant, Terry Shaffer and Clint Moore
- 11:30 – 12:00 Announcements and meeting adjournment

* denotes student presenters

Certification Roundtable – 1:00 – 4:00 PM – Susan Rupp, leader

MEETING SPONSORS:

The Truax Company, Minneapolis, MN, UAP Timberland, Spearfish, SD, Ducks Unlimited
Mid Dakota Vegetation Management, Miller, SD, Pheasants Forever



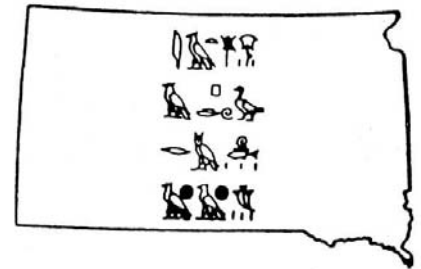
Founded in 1936 as The Society of Wildlife Specialist, The Wildlife Society (TWS) has evolved into an international nonprofit organization of professional wildlife ecologists and managers. Members number over 9,000 from 40 different countries and include administrators, biologists, conservation officers, educators, managers and researchers. The objectives of TWS are to:

1. Promote sound stewardship of wildlife resources and the environments upon which wildlife and humans depend;
2. Undertake an active role in preventing human-induced environmental degradation;
3. Increase awareness and appreciation of wildlife values; and
4. To seek the highest standards in all activities of the wildlife profession.

The South Dakota Chapter of TWS (SDTWS) was initiated on February 19, 1966 with 56 charter members. SDTWS is affiliated with the Central Mountains and Plains Section, one of 7 subdivisions of TWS.

Chapter Meetings and Activities

The full membership of SDTWS meets annually in the spring to exchange scientific information through presented papers, debate current issues in wildlife management and land use, and conduct chapter business. The chapter's Executive Board of Directors, consisting of President, Past-President, President-Elect, Secretary-Treasurer, and two standing board members meet at least 4 times each year to discuss issues that do not require full chapter approval. The chapter also communicates with its membership through a newsletter, *The Prairie Voice*, published within 30 days of Executive Board meetings. The newsletter includes board meeting minutes, committee activity reports, a summary of chapter correspondence, updates on professional conferences, and profiles of chapter members.



South Dakota Chapter of The Wildlife Society

Program Abstracts

Listed in Order of Presentation

Keeping the “Green” in Green Energy

Jill Shaffer, USGS Northern Prairie Wildlife Research Center, 8711 37th St. SE
Jamestown, ND 58401. jshaffer@usgs.gov

North Dakota House Bill 1462 established an energy policy commission for the purpose of establishing a comprehensive energy policy. Governor John Hoeven appointed to the commission 14 people representing industries with energy interests. Several meetings have been or will be held around the state in 2007 and 2008, addressing various energy topics. USGS and The North Dakota Chapter of The Wildlife Society attended the October 31, 2007 meeting on renewable energy. Jill Shaffer presented a talk outlining the potential impacts to wildlife and habitats of industrial-size wind facilities in North Dakota and summarizing the guidelines and regulations that other states are promulgating to address such impacts. That presentation will be given to the members of the NDCTWS, as will a summary of actions that the Alternative Energy Committee of the NDCTWS is taking to become a proactive player in the development of wind energy in North Dakota.

No Child Left Inside

Chad R. Tussing, South Dakota Department of Game, Fish & Parks, 523 E. Capitol, Pierre, SD 57501

Plugged-in, networked, and texting, modern youth are making more connections with the electronic world than the real one. Americans spend, on average, 4 hours in front of the TV each day. For youth, this jumps to an average of 6.5 hours per day, including time at a computer. As a result, a lot of youth are learning more about what’s going on across the globe than across the street. Or about what’s happening in their own backyards.

Project WILD

Chad R. Tussing, South Dakota Department of Game, Fish & Parks, 523 E. Capitol, Pierre, SD 57501

Project WILD is an international, award-winning curriculum designed to teach students HOW to think, not WHAT to think, about wildlife conservation. Using hands-on activities to engage learning, Project WILD successfully incorporates conservation topics into schools and other education settings. Come learn what Project WILD is all about and how it can be an important tool for wildlife professionals. Participants will experience one of the activities first-hand and will see how this can be a valuable resource for educating the public about wildlife conservation

To address this, Game, Fish & Parks is adding a new tool to its outdoor education toolbox – No Child Left Inside. Designed to increase opportunities for basic outdoor discovery, this program is providing tools to help get kids outdoors, learning. This session will briefly explore what has gone before, what is happening now, and what is planned for the future with regards to this phenomena, labeled by some as “nature deficit disorder.”

GENETIC STRUCTURE OF BLACK HILLS COUGARS

Jonathan A. Jenks. Department of Wildlife and Fisheries Sciences, South Dakota State University, Brookings, SD 57007-1696, USA

Daniel J. Thompson. Department of Wildlife and Fisheries Sciences, South Dakota State University, Brookings, SD 57007-1696, USA, Daniel.Thompson@sdstate.edu

Dorothy M. Fecske. North Dakota Game and Fish Department, Bismarck, ND 58501, USA

Michael K. Schwartz. Rocky Mountain Research Station, US Forest Service, 800 East Beckwith, Missoula, MT 59801, USA.

Kristine L. Pilgrim. Rocky Mountain Research Station, US Forest Service, 800 East Beckwith, Missoula, MT 59801, USA.

Assessing genetic structure of free-ranging wildlife species can provide knowledge of population demographics that can supplement field data, which can be important for large carnivores that typically have relatively low densities across the landscape. Previous research on genetic structure of cougars indicated that movement occurred between most western cougar populations despite barriers (both habitat and human caused) that could potentially isolate populations. We assessed the genetic structure of a cougar population in the Black Hills of South Dakota and Wyoming, which was nearly if not entirely extirpated from the region in the early to mid 1990's.

In addition to evaluating genetic structure, we conducted population assignment tests with nearby cougar populations (North Dakota and Wyoming) based on 20 microsatellite loci. We conducted genetic analyses on 134 cougars from the Black Hills along with 18 cougars from North Dakota. Although Black Hills cougars showed a marginally significant genetic bottleneck, they do not appear to have any deleterious effects from the event. South Dakota cougars had an average observed heterozygosity (H_O) of 0.547, which was similar to other cougar populations. We were able to successfully assign cougars from South Dakota and North Dakota into separate populations based on data obtained from 20 loci.

Multiple Scale Habitat Selection By Elk In A Homogeneous Ecosystem

Mark A. Rumble, U.S. Forest Service, Rocky Mountain Research Station, Forest and Grassland Research Laboratory, Rapid City, SD 57701

R. Scott Gamo, Idaho Department of Fish and Game, Idaho Falls, ID 83401

Abstract: Habitat selection by animals occurs at multiple scales. Most methods of resource selection assume independence of variables, thus cannot consider variables across scales because of cross-scale correlation. Furthermore, when resources selected are homogeneously distributed and abundant, attaining statistical significance becomes difficult. We used Classification and Regression Trees to explore multiple scale habitat selection by elk in the Black Hills. This tool

is appropriate because at each branch in the classification tree all variables are considered to estimate the best criteria for classifying groups. At the landscape scale, vegetation structural stage was the only variable that improved the classification. Elk feeding and bedding sites were best grouped and elk selected stands with large diameter trees and open to moderate overstory canopy closure categories. At the microhabitat scale, elk bed sites had <0.04% cover of snowberry, while random sites and feed sites had more. Most elk feed sites were separated from random sites by the occurrence of 34 m of roads within 250 m. Finally, elk feed sites had little horizontal cover. Sites classified as primarily random at the landscape level, were separated from elk sites in that group based on road density. All elk sites had <11.5 m of roads within 250 m. Among these elk sites, those with >0.13% canopy cover of snowberry were identified as elk feed sites or random sites. Sites with <0.13% canopy cover of snowberry were primarily elk bed sites. These analyses show elk selecting for larger diameter open stands of primarily ponderosa pine. Within these, when elk were feeding they selected sites with characteristics of less canopy cover characterized by a western snowberry and less horizontal cover. Elk clearly avoided road in all analyses. The similarity of random sites to elk sites suggests homogeneous and abundant resources in the Limestone Plateau of the Black Hills.

A resource selection habitat model for northern flying squirrels in the Black Hills of South Dakota.

Melissa Hough* and Charles D. Dieter. Department of Biology, South Dakota State University, Brookings, SD 57007

A resource selection function (RSF) habitat model was created for northern flying squirrel distribution throughout the Black Hills. Logistic regression was used to compare habitat variables at used locations (observed radio-tracking and trapping locations) to a random sample of available sites throughout the study area. Estimated coefficients of the significant variables from the logistic regression model were incorporated into a GIS raster layer to produce a map with RSF values for the Black Hills. The RSF values were transformed to a relative probability of habitat use ranging from 0 to 1. Independent validation data were used to determine a good model fit based on the predictive performance of the RSF. Data used in the model determined northern flying squirrels in the Black Hills were associated with higher precipitation, closer distance to stream, aspen habitat, northwest aspect, higher basal area of snags, and a higher density of live trees and snags. The RSF map delineates important areas of habitat use by northern flying squirrels throughout the Black Hills and can be used for management purposes, as well as a baseline for future research.

UNDERSTANDING WHITE-TAILED DEER PRODUCTIVITY: POPULATION ECOLOGY OF NEONATES

¹Grovenburg, T. W., ¹J. A. Jenks, ²R. W. Klaver, ¹S. P. Rupp, ³C. N. Jacques, and ⁴M. C. Wimberly.

¹Department of Wildlife and Fisheries Sciences, South Dakota State University, Brookings, SD 57007, USA.

²U.S. Geological Survey, National Center for Earth Resources Observation and Science (EROS), Sioux Falls, SD 57198, USA.

³Wisconsin Department of Natural Resources, Bureau of Science Services, Madison, WI 53716, USA.

⁴Department of Geography, South Dakota State University, Brookings, SD 57007, USA.

Knowledge of neonate mortality rates is critical to understanding how preseason mortality will affect deer harvest. We captured 22 white-tailed deer (*Odocoileus virginianus*) neonates during summer 2007 and gathered a total of 1,798 locations, with a mean 95% error ellipse of 4.1 ha. Mean 95% home range size increased significantly ($P = 0.0441$) with age of neonate. Mean 95% home range size for June, July, and August was 0.5 (SE = 0.09, $n = 21$), 0.6 (SE = 0.06, $n = 21$), and 0.8 km² (SE = 0.14, $n = 15$), respectively. Daily mean movement increased significantly ($P < 0.0001$) with age of neonate. Mean daily movement during June, July, and August was 232.6 (SE = 16.4, $n = 21$), 301.9 (SE = 16.1, $n = 21$), and 360 m (SE = 20.3, $n = 15$), respectively. During summer 2007, 2 animals died and survival rates for the months of June, July, and August were 0.95 (SE = 0.04, $n = 22$), 1.00 (SE < 0.00, $n = 21$), and 1.00 (SE < 0.00, $n = 19$), respectively. Summer (June-August) and 6 month survival was 0.94 (SE = 0.06, $n = 22$) and 0.85 (SE = 0.10, $n = 22$), respectively. We analyzed 51 neonatal bed sites and grass cover ($P = 0.016$), overstory height of vegetation ($P < 0.0001$), and understory height of vegetation ($P = 0.013$) differed from those of random microhabitat sites. In June, 68.6% of neonate locations were in grassland habitat; while in August, 46.9% of locations were in fields of corn. Our results indicated that grassland habitats are important fawning areas for deer in north-central South Dakota.

WHITE-TAILED DEER PREFERENCE OF CORN HYBRIDS DURING THE GROWING SEASON.

Joshua A. Delger, Jonathan A. Jenks, and Kevin L. Monteith, Department of Wildlife and Fisheries Sciences, South Dakota State University, Brookings, SD 57007

Field corn (*Zea mays*) damage by deer can be substantial and result in millions of lost revenue. Numerous methods exist to aid in minimizing deer depredation on corn, but all have met with varying degrees of success and feasibility. In addition, no information is available on preference of white-tailed deer (*Odocoileus virginianus*) for corn hybrids during the growing season and how preference might affect depredation patterns. The objectives of our study were to 1) document deer preference among corn hybrids and husbandry practices during the growing season, 2) examine physical and nutritional characteristics that make hybrids more or less desirable to deer, and 3) compare preference of captive and wild deer through the use of manipulated food plots in rural areas. Research was conducted at the South Dakota State University, Wildlife and Fisheries Research facility in Brookings, South Dakota. Captive adult female white-tailed deer ($n=4$) were used in corn food plot studies with different corn hybrids planted in subplots separated by grass buffers. Preference was documented by consumption of each hybrid during timed trials. In 2006, data were collected weekly from 05 June – 15

September. Preference differed ($P < 0.02$) among hybrids throughout the study period. Mean weekly number of feeding observations for hybrid A (Dekalb DKC44-92 (RR2)), hybrid B (Dekalb DKC46-28 (RR2)), and hybrid C (Dekalb DKC48-52 (RR2)) were 48.2, 33.4, and 34.5, respectively. In 2007, data were collected weekly from 27 May – 29 August. Preference differed ($P < 0.001$) among hybrids within each growth phase (early growth, rapid growth, dry-down) throughout the study period. Mean weekly number of feeding observations during early growth was 50.8 for hybrid A, 32.5 for hybrid D (Dekalb DKC40-07 (RR2)), and 42 for hybrid E (Dekalb DKC55-82 (RR2)); rapid growth weekly observations were 44 for hybrid A, 67.7 for hybrid D, and 50 for hybrid E; and dry-down weekly observations were 40 for hybrid A, 22 for hybrid D, and 31.7 for hybrid E. Experimental food plots also were established in cooperation with local landowners in areas susceptible to depredation by wild deer. Preference was documented by the frequency of damage within each plot. Preference differed ($P = 0.06$) among hybrids with mean percentages of plot damage at 48% for hybrid A, 29% for hybrid D, and 23% for hybrid E. Use of certain corn hybrids and/or husbandry practices (e.g., herbicide, fertilizer treatments, etc.) could reduce deer depredation by altering (either increasing or decreasing) use of corn depending on management prescription. Results of this study will provide recommendations for minimizing crop damage experienced by crop producers and maximizing the effectiveness of state managed food plots.

False map, Spiny softshell and smooth softshell turtle nest and nest site habitat characteristics along the Missouri National Recreation River in South Dakota

Laura A. Dixon and Charles D. Dieter . Department of Biology and Microbiology, Box 2207B, South Dakota State University, Brookings, South Dakota 57007

Little is known about the ecology and reproductive habits of turtles in South Dakota. The spiny softshell (*Apalone spinifera*) and smooth softshell (*A. mutica*) are listed as species of concern in South Dakota and the false map turtle (*Graptemys pseudographica*) is listed as state threatened. Information relating to habitat and nest site characteristics is needed to form sound management plans. Surveys were conducted for turtle nests along the Missouri National Recreation River from Gavin's Point Dam (RM 811) to Ponca State Park (RM 753) in 2006 and 2007. Turtle nests were located by walking shorelines and sandbars while searching for tracks, scrapes and nesting turtles. Once located, each nest was identified to species and recorded on GPS. Nest characteristics taken were number of eggs, egg size, depth and width of nest, soil temperature and distance from water. Nest site habitat characteristics were taken for land cover classification, vegetation type, height and percent cover (daubenmire scale), substrate composition and debris in a 1m quadrant. A paired random sample for habitat characteristics was also taken with each nest to determine if there is a selection process being utilized by nesting females.

Turtles were first observed nesting in 2006 on June 6th and nesting continued until July 23rd 2006. During the 2007 field season, the first nest was found on May 28th and the last nest located was June 28th. A total of 17 false map and 45 softshell nests were located intact and excavated for measurements. Land cover classification, vegetative cover and substrate composition were important, with turtles selecting open sandy areas for nest sites.

Turtles in the 59-Mile District of the Missouri National Recreational River: Species composition, age structure, sex ratios and abundance.

Aaron J. Gregor and David L. Swanson. Department of Biology, University of South Dakota, 414 E. Clark St., Vermillion, SD 57069

Effective species management relies on identifying the size, location and age structure of populations. These measurements serve as a baseline against which future changes in population attributes can be detected. Turtles are long-lived, late maturing species that are limited in their ability to respond to long-term increases in mortality of neonates, and even less so to increases in the mortality of juveniles and adults. Within the Missouri National Recreational River (MNRR) turtle populations are impacted by a number of factors which include limited access to nesting sites due to bank erosion, river bed degradation, and bank stabilization projects; flooding of nest sites, vegetation encroachment on nesting habitats, overall reductions of suitable nesting habitat, and increased predation pressure related to high concentrations of nests within available areas. We initiated a mark-recapture study to investigate the habitat relationships, species composition, age structure (e.g. juveniles, subadults, and adults), sex ratios, and abundance of turtle populations on the 59-Mile District of the MNRR. Turtles were trapped using baited hoop nets (20) and fyke nets with leads (6) on four study reaches of the MNRR from June through August 2007. During each sampling session traps were set for a total of three nights and each site was sampled twice over the course of the field season. We report here on the initial findings of this study.

River otter distribution in South Dakota.

Jacque R. Ermer and Silka Kempema.

River otters (*Lutra canadensis*) are important to a variety of rivers/wetland ecosystems and are often referred to as a “flagship species”. They were once historically found throughout South Dakota, being most common in the eastern portion of the state. River otters are now state protected as threatened due to habitat destruction, past unregulated trapping, and incomplete information on distribution. The intent of this project is to ultimately establish a practical long-term monitoring program for river otters in South Dakota by identifying suitable habitat and the most feasible monitoring methods. Since the early 1980s, the South Dakota Natural Heritage Program has collected reports of otter sightings and incidental catches. Professional biologists and state and licensed trappers also have been surveyed on their knowledge of otter locations. However, no standardized surveys have been used to collect distribution and/or biological data on otters in South Dakota. Because of their aquatic and semi-aquatic environment and secretive nature, they can be difficult to census. Characteristics being used to identify suitable otter habitats and target survey efforts include water permanence, availability, gradient, beaver presence, fish species richness, and others. Habitat analysis has not yet been completed. Recently, multiple techniques have been used to survey and document distribution and reproductive status of river otters in eastern South Dakota. These preliminary investigations consisted of latrine surveys, winter bridge surveys, and aerial snow track surveys since fall/winter 2005. As a result, otters recently have been located in previously undocumented rivers, streams, and wetlands in eastern South Dakota. Furthermore, biological information is being collected from all incidentally caught otters.

Evaluation of an augmentation of bighorn sheep at Badlands National Park, South Dakota

Teresa J. Zimmerman,¹ Badlands National Park, National Park Service, Interior, SD 57750,
Jonathan A. Jenks, Department of Wildlife and Fisheries Sciences, South Dakota State University, Brookings, SD 57007

Robert W. Klaver, United States Geological Survey, EROS Data Center, Sioux Falls, SD
David M. Leslie, Jr., United States Geological Survey, Oklahoma Cooperative Fish and
Wildlife Research Unit, Department of Zoology, Oklahoma State University, Stillwater, OK
74078 **Eddie Childers**, Badlands National Park, National Park Service, Interior, SD 57750

Rocky Mountain bighorn sheep (*O. canadensis canadensis*) were reintroduced to Badlands National Park (BNP) in 1964, representing the eastern most extent of the species' current and historic range. In September 2004, 23 bighorn sheep were captured at Wheeler Peak, New Mexico and released at BNP to augment the existing population of approximately 68 individuals. Because it has been recommended that introduced populations are regularly monitored to evaluate the success or failure of transplants, the objectives of this study were to: 1) document survivorship, natality, dispersal, and recruitment of introduced bighorn sheep females and their offspring, 2) estimate 95% and 50% adaptive kernel planimetric and surface area home ranges of introduced bighorn sheep females, 2) determine habitat selection of introduced bighorn sheep females, 4) compare home range size and habitat selection of introduced to resident bighorn sheep females. Eighteen of 23 introduced bighorn sheep survived/remained with the sub-population. In 2005 and 2006, the 3 month-old lamb to adult ewe ratios were 90:100 and 62:100, respectively. In June 2006, 9 of 9 surviving yearling lambs dispersed from BNP with dispersal distances ranging from 43 to 524 km. In May 2007, 3 of 8 surviving yearling lambs dispersed from BNP with a dispersal distance of 25 km. The 95% adaptive kernel and surface area estimates of the introduced bighorns increased between years, but core home range size did not differ between years. The 95% and 50% adaptive kernel planimetric and surface area home range estimates were greater in resident than introduced sheep. Introduced and resident bighorn sheep differed in their use of habitat with introduced sheep selecting areas closer to roads, human use areas, and water. We discuss management implications of augmentation on the bighorn sheep population at BNP.

Evaluation of barriers to black-tailed prairie dog (*Cynomys ludovicianus*) colony expansion, Bad River Ranches, South Dakota

Marcus B. Gray, Department of Wildlife and Fisheries Sciences, South Dakota State University, Brookings.

Jonathan A. Jenks, Department of Wildlife and Fisheries Sciences, South Dakota State University, Brookings.

The state of South Dakota recently approved a black-tailed prairie dog (*Cynomys ludovicianus*) conservation and management plan (House Bill 1252 and Senate Bill 216, An Act to Mitigate the Impact of Prairie Dogs), which places restrictions on prairie dog colonies that encroach upon private property where their presence is not desired. A one-mile (1.6 km) prairie dog free zone must be maintained if a formal complaint is issued with the state. Passage of the management plan has elevated the importance of barrier development in the management of prairie dogs. The objectives of our study were: 1) evaluate the efficacy of different physical and visual barrier designs at limiting the expansion of prairie dog colonies and 2) analyze the cost-effectiveness of the barrier designs in terms of materials, installation, and maintenance. Five study sites were chosen on the Bad River Ranches owned by Turner Enterprises, Inc. in Stanley and Jones counties near Fort Pierre, South Dakota. Barriers evaluated include: vinyl fencing with chicken

wire, straw bales, and American Bison (*Bison bison*) exclosures. Barriers were 100 meters in length and located within monitoring plots (1 ha). Grazing and mechanical mowing were allowed on both sides of barriers. A prairie dog free zone was established on abutting property adjacent to active colonies. Variables such as weather, soil type, topography, vegetative characteristics, prairie dog density, and rate of expansion were recorded for each colony within monitoring plots. Efficacy of barriers was evaluated by the presence of active burrows in the prairie dog free zone beyond barriers and the relative cost of each barrier type. We documented 212 active burrows beyond barriers, 145 occurred within the control treatments. The exclosures and vinyl exhibited 50 and 17 burrows, respectively. Use of barriers to deter movement of prairie dogs may represent a viable alternative to poisoning.

Final Results of the Colonial Waterbird Inventory Project and a Long-term State-wide Monitoring Plan.

Nancy Drilling, Rocky Mountain Bird Observatory

Colonial waterbirds prefer to breed in high-density groups in a small number of locations, making these species vulnerable to catastrophic events and wetland loss. Of 33 species of breeding colonial and semi-colonial waterbirds in South Dakota, 16 are of conservation concern. Identifying and monitoring breeding colonies are the primary tools for tracking populations. Therefore, our first objective was to compile an inventory of waterbird breeding sites. During the summers of 2005 - 2007, 1025 sites were surveyed for 46 breeding species. Of these, 405 sites (39.5%) had confirmed waterbird breeding during at least one year. Twenty-six wetlands were identified as being important colony sites, defined as having >200 total breeding pairs or >five breeding species. Breeding was confirmed for 32 of 46 targeted species. American White Pelicans and Double-crested Cormorants were the most abundant nesting colonial waterbirds statewide while Great Blue Herons were distributed in the greatest number of colonies. The second project objective was to develop a long-term statewide monitoring plan. The monitoring goal is to collect information that managers and landowners can use to effectively manage and conserve colonial waterbirds and to prevent future declines of these species in the state. Specific objectives are to improve information on conservation status of breeding colonial waterbirds, identify and track factors that could result in a decline of these species, determine how management actions impact breeding populations, and provide information to aid management of waterbird-fisheries conflicts. The state is divided into eight regions ranked according to importance for breeding waterbirds; higher-ranked regions will be monitored more intensely. Aerial transect surveys will help identify new colonies. Ground colony visits will collect data on abundance, habitat, threats, and other variables that address objectives. This plan will be implemented by SD GFP's Wildlife Diversity Program with assistance from citizen-scientists, and federal and state biologists.

Influence of Conservation Reserve Program (CRP) Lands and Landscape Attributed on the Distribution and Abundance of Prairie Grouse.

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Changes in distribution and abundance of prairie grouse have been linked to landscape-level habitat changes throughout their range. Sod busting has altered much of the landscape in the upper Midwest by converting large tracts of native prairie to cropland. The Conservation Reserve Program (CRP) of the Federal Food Security Act of 1985 converted millions of cropland acres back to perennial grassland. These large-scale land use changes have undoubtedly impacted prairie grouse abundance and distribution. We investigated how prairie grouse distribution and abundance were related to landscape-level land use at multiple scales in northeastern South Dakota. We searched township sized sites for leks in three different counties (Day, McPherson, and Hyde). Land use in the study areas were dominated by native rangeland in Hyde (68%) and McPherson (46%) Counties and by cropland in Day (46%) County. Lands enrolled in the CRP were also abundant in Day (24%) and McPherson (15%) Counties, but scarce in Hyde (<1%) County. Thirteen leks were located in the Hyde County site, four were located in the Day County site, and nine in the McPherson County site. Both sharp-tailed grouse and greater prairie-chicken leks were present in Hyde County while only sharp-tailed grouse were present at the other two sites. We generalized and digitized the entire landscape in the study sites and within a 3km buffer around the study sites into 12 land use categories using a vector-based GIS. We analyzed the land use surrounding lek sites at seven different buffer widths (400, 800, 1200, 1600, 2000, 2400, and 3000m) because birds may relate to the landscape differently at different scales. We identified land use factors that influence male lek attendance and lek location at multiple scales.

Survival and winter habitat use by greater sage-grouse in the Dakotas.

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Greater sage-grouse (*Centrocercus urophasianus*) populations and their distributions have been declining. Extensive sagebrush habitat loss has occurred from changes in land use (e.g., conversion of land to agriculture, altered fire and grazing regimes, and energy development). As a result of habitat loss from fragmentation and degradation, greater sage-grouse populations have declined range-wide by 3.5% per year from 1965 to 1985, and 0.4% per year from 1986 to 2003, and their distribution has decreased by 45% across North America. Given these facts, knowledge of survival and habitat use are critical for long term management of greater sage-grouse. Currently, no empirical information related to survival or winter habitat use exists for sage-grouse on the eastern fringe of their range. Our objectives were to document seasonal patterns of survival and describe characteristics of winter habitat use by greater sage-grouse. We monitored radiomarked sage-grouse from spring 2005 through spring 2007 in southwest North Dakota and from spring 2006 through winter 2007-08 in northwest South Dakota. Our primary research objectives were to collect baseline information that identifies seasonal patterns of survival, movement patterns, winter habitat use, brood breakup, and population and landscape-level genetics for management of this species by federal and state wildlife agencies.

Anthraquinone corn seed treatment (Avitec™) as a feeding repellent for ring-necked pheasants (*Phasianus colchicus*) on newly planted corn in eastern South Dakota

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In recent years South Dakota's ring-necked pheasant (*Phasianus colchicus*) populations have increased and, along with it, complaints from agricultural producers regarding pheasant depredation on newly planted and emerging corn have increased. Heisterberg (1984) estimated that \$49 million is lost to pheasant depredation annually in the United States. Pheasants will consume the kernels of freshly planted and emerging corn plants until the plant reaches the three-leaf stage or the plant is approximately 4 inches tall but may continue until the corn reaches a height of 6-10 inches (Hendrickson and Tellier 1943). 9,10-anthraquinone is a nontoxic, naturally occurring post ingestional irritant that results in conditioned taste aversion when the bird experiences illness after consuming the kernel and associates the illness with the food (Avery 2003). Avitec™ is a 95% anthraquinone repellent that has been approved for emergency use in Wisconsin, Minnesota and Michigan as a seed-corn treatment where Sandhill cranes (*Grus canadensis*) have been damaging corn fields by eating the corn seeds shortly after planting. In 2006, a 2-year study was initiated to determine if Avitec™ is an effective pheasant repellent to germinating corn seeds. In 2006, percent corn remaining in fields treated with Avitec™ was 57.4 ± 13.7 ; percent corn remaining in control fields was 40.6 ± 13.7 . In 2007, percent corn remaining in fields treated with Avitec™ was 76.9 ± 2.6 ; percent corn remaining in non-treated fields was 72.3 ± 2.6 ; and corn remaining in fields treated with Avitec™ plus hydrolyzed casein and hydrolyzed collagen to attempt to reduce both pheasant and thirteen-lined ground squirrel (*Spermophilus tridecemlineatus*) depredation was 72.4 ± 2.6 . Consumption of Avitec™ treated corn seed in caged feeding trials when no other feed was available was $-0.14 \text{ g} \pm 2.1$; consumption of Avitec™ treated corn seed when non-treated was available was $-0.46 \text{ g} \pm 0.68$. Consumption of non-treated corn seed when no other feed was available was $37.4 \text{ g} \pm 4.5$; consumption of non-treated corn seed when treated seed was available was $37.2 \text{ g} \pm 4.3$. Avitec™ showed significant repellency in caged feeding trials and decreased depredation in field trials. The experimental hydrolyzed casein and collagen may not be effective rodent repellents. Therefore, using anthraquinone based products may be beneficial in areas where pheasants are the primary cause of damage.

Introduction of eastern wild turkeys into agricultural landscapes of eastern South Dakota: evaluation of new and recently established transplants.

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The eastern wild turkey (*Meleagris gallopavo silvestris*) was the only wild turkey native to South Dakota; however, it was extirpated from the state in the early 1900s. Trap-and-transplant

programs since the 1950s have helped to re-establish turkey populations throughout the United States, including South Dakota. A two-year study was initiated to determine survival, nest success, and movements of eastern wild turkeys transplanted in Brookings County and Hamlin County, South Dakota. A total of fifty-two hens were fitted with radio-collars and tracked 2-3 times per week from March through August to determine these objectives. Hen survival was estimated at 43.9% (n=52) throughout the study; 63.2% (n=39) and 69.5% (n=35), for 2006 and 2007, respectively. Survival was lowest in the spring 76.6% (n=39) and 81.3% (n=34) for 2006 and 2007, and above 91% during the winter and summer for both years. Survival was significantly lower in the spring compared to both winter and summer survival rates ($p=0.016$, $p=0.028$). Overall nest success for the two years was estimated at 11.3% (n=18) and 15.8% (n=25), for 2006 and 2007, respectively (Program MARK). Mean distance from release site to nest site was 4.1 km, and maximum straight line distance from release to nest site was 20.9 km. The introduction appears to be successful because of the tracts of grasslands, mixed shelterbelts, small woodlots, and the many agricultural fields in the area capable of supporting a sustainable population of eastern wild turkeys.

Merriam's Turkey Nest Survival and Factors Affecting Nest Predation by Mammals

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Nest success is an important parameter affecting population fluctuations of wild turkeys (*Meleagris gallopavo*). The factors influencing mammalian predation of turkey nests are complicated and not well understood. Therefore, we assessed nest hazard risk by testing competing hypotheses of Merriam's turkey (*M. g. merriami*) nest survival in a ponderosa pine (*Pinus ponderosa*) ecosystem during 2001-03. Nesting information was collected on 83 female Merriam's turkeys ($n = 73$ adults, $n = 10$ yearlings). Annual nest success averaged 50% for adult females (range = 45–59%) and 83% for yearling females (range = 75–100%). Proportional hazard modeling indicated that precipitation increased the hazard of nest mortality. However, nest concealment may also influence nest predation. Estimated hazard of nest predation was lowered when incubating females received less precipitation. Greater shrub cover and visual obstruction around nests, and nests that were located on steeper slopes also reduced hazard of predation. Coyotes (*Canis latrans*) were the primary predator of turkey nests. We hypothesize that precipitation is the best predictor of nest survival for first nests because coyotes use olfaction effectively to find nesting females during wet periods. Temporally, as the nesting season progressed, precipitation declined and vegetation cover increased and coyotes may have more difficulty detecting nests under these conditions later in the nesting period. Monitoring the timing and amount of spring precipitation may provide an index to annual nest success in wild turkeys.

Nesting ecology and associated habitats of greater sage-grouse in northwest South Dakota

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Greater sage-grouse (*Centrocercus urophasianus*) populations have declined range-wide at an overall rate of 2% per year from 1965 to 2003. Reasons for the decline are numerous, but are mainly attributed to human-induced factors (i.e., sagebrush degradation and removal, poor range management practices, oil and gas exploration, and West Nile virus infection). Sage-grouse occupy habitats at the eastern fringe of their range in western South Dakota and recent research has suggested that sagebrush obligates may not utilize habitats as predictable as core areas (e.g. central Wyoming). A 2-year study was conducted to investigate the nesting ecology and habitat selection of sage-grouse in northwestern South Dakota. Female sage-grouse were captured and radiocollared ($n = 82$) on traditional display grounds. Radio-marked hens were tracked to estimate nesting effort, nest success, and associated habitats. Nest initiation was 0.96 (70/73), with overall nest success of 0.46 ± 0.05 ($n = 73$, Program MARK); adults (≥ 2 yrs) were more successful (0.47 ± 0.03) than yearlings (0.42 ± 0.03). Hens selected habitats that provided more sagebrush canopy cover and nest bowl visual obstruction compared to random sites (AIC weight = 0.39). Nest success models developed in Program MARK indicated taller grass structures increased nest success ($\beta = 0.15$ SE = 0.03), and had a dramatic impact on nest success, achieving a summed AIC weight of 1.0. Management of sage-grouse on the eastern edge of their range should focus on increasing levels of sagebrush density and canopy cover while maintaining current grass structures.

Crop depredation during summer by Canada geese in eastern South Dakota.

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Resident Canada geese (*Branta canadensis*) can cause significant crop damage to soybeans, especially during the molt. The South Dakota Game Fish and Parks Department (SDGFP) has a program to alleviate this crop damage. We evaluated the effectiveness of this program and attempted to determine other factors that affected the amount of damage to soybeans. We also compared shoreline characteristics of damaged to undamaged crop fields to determine their role in field selection by flightless geese. Both distance of crop field from standing water and visual obscurity by vegetation were important in determining selection, with geese damaging soybeans that were closer to water and had shorelines with less visual obstruction. The application of deterrents by SDGFP was effective in reducing crop damage, but the date of application was also important. Fields where deterrents were applied early in the growing season had less damage than fields where deterrents were applied later. If deterrents are properly applied as soon as damage starts, Canada goose damage to soybeans can be kept to a minimum. Energized fences were the most effective deterrent for molting geese, while visual and sonic deterrents were effective for flying geese. On some fields, a combination of deterrents may be needed. In addition, sites must be maintained regularly and adjustments made to deterrents if goose damage continues.

A multi-region, adaptive approach to invasive plant management on Fish and Wildlife Service-owned native prairies

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The resource objective behind this talk is restoration of prairies on U.S. Fish and Wildlife Service (Service) lands in the Northern Great Plains that are variably invaded by introduced grasses and woody vegetation. The application of various strategies (e.g., prescribed fire, grazing) most likely to

enhance competition of native grasses and forbs on prairies that differ by geographic location, tract size, degree of invasion, soils, etc. is an inherently complex undertaking. For example, competition among native and introduced plants varies by degree of plant invasion (or conversely degree of intactness) and by the particular species or group of species responsible for the invasion. Competition also will vary in response to treatment type (e.g., prescribed fire), duration, intensity, and frequency. The many sources of variation represent uncertainties in plant response (i.e., competition) that can be couched as working hypotheses. These hypotheses can be expressed as simple models that can be investigated in an applied study following principles of adaptive management. By repeatedly comparing model predictions to system outcomes, evidence is systematically acquired to support or refute the various hypotheses. As evidence for a particular model (hypothesis) builds, projections from that model are given increased consideration in future decision-making. We describe a recently funded, multi-Region effort to develop a structured decision support process that can be used to guide and support management actions to restore native prairies on Service lands in the northern Great Plains.

