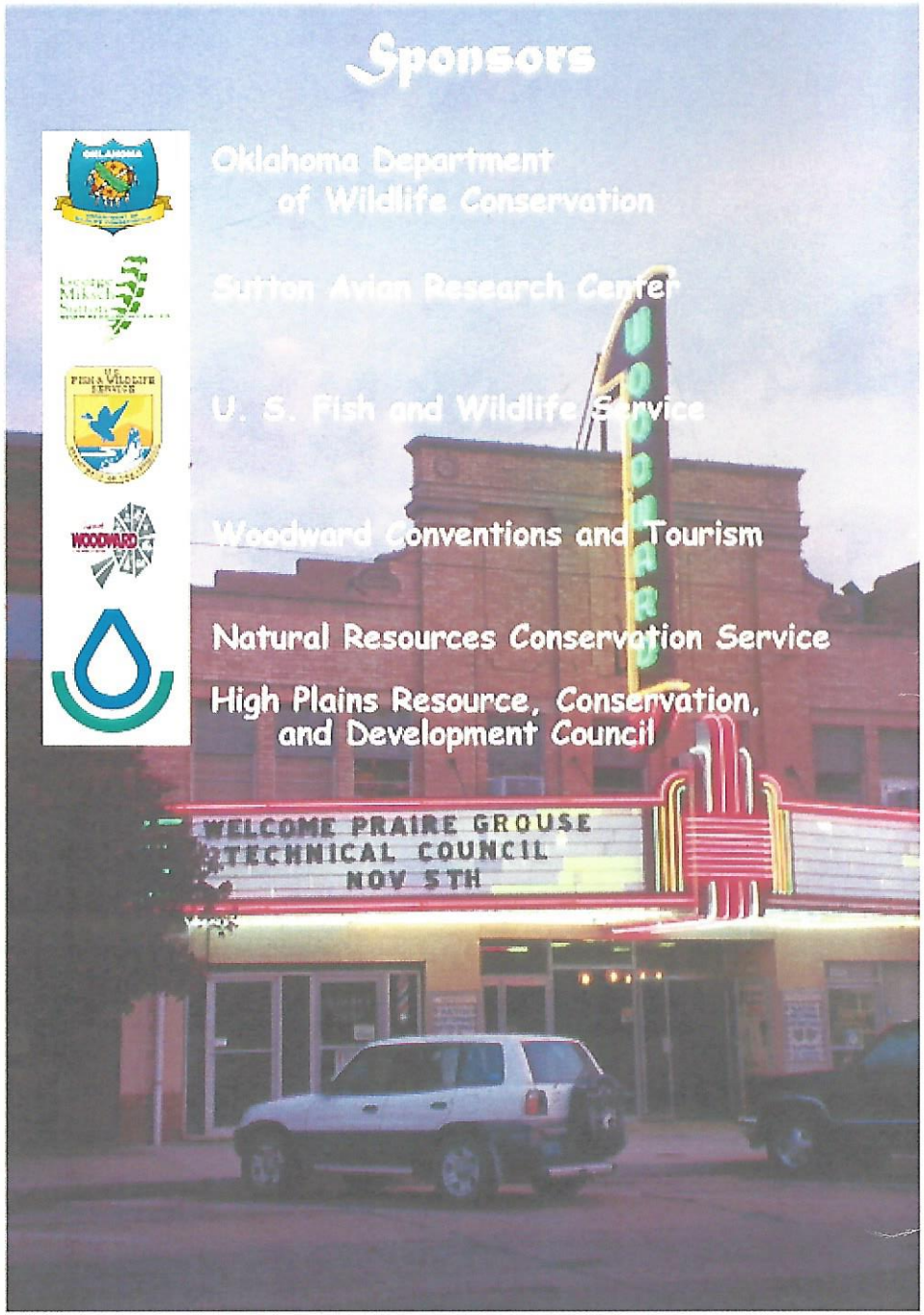
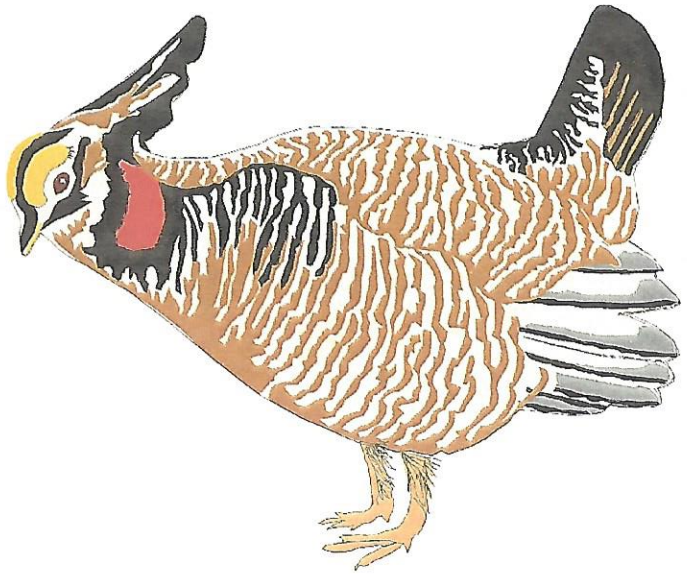


24th Meeting of the Prairie Grouse Technical Council



Woodward, Oklahoma
November 5 – 8, 2001

Proceedings

of the

24th Meeting

of the

Prairie Grouse Technical Council

Woodward, Oklahoma, USA

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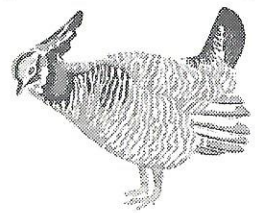


- all of the speakers. Their willingness to share knowledge, expertise and insight was educational, informative and inspirational;

- Ron Folks, Joe Hemphill and Dennis Geary for the excellent Bar-b-Que dinner Tuesday evening;

- Dan Reinking and Colin Berg for their wizardry with the (potentially cantankerous) audiovisual equipment;

- field trip planners Don Wolfe and Stephanie Harmon, and hosts and speakers Eddie Wilson, Dan O'Hair, Willard Heck, Marvin Carnagey, Kenny Knowles, and Sam Fuhlendorf, all of whom contributed to an interesting and informative tour of Lesser Prairie-Chicken country;

- Steve Grossman and Delmar Smith for sharing their expertise and wit pertaining to dog training;

- Richard Baydack and Don Sexton for their services (in my absence) as Business Meeting Chair and Recorder;

- Dr. Peter Hudson for graciously giving of his time to come and share with us a timely and pertinent perspective of gamebird management from "across the seas;"

- Tom Lucas, auctioneer, all-around good guy (and need I say more?);

- a host of volunteers who readily accepted and admirably completed the most menial of tasks (most often accomplished "behind the scenes"). Their efforts contributed substantially to the smooth flow of the conference, and are greatly appreciated; and

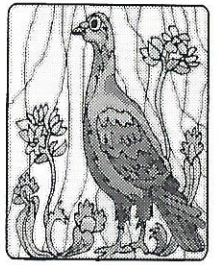
- major sponsors: G. M. Sutton Avian Research Center, USFWS Tulsa Ecological Services Office, Oklahoma Department of Wildlife Conservation, High Plains RC&D Council, and the Woodward Area Chamber of Commerce, all of whom helped provide necessary logistical, financial, and in-kind support.

I would like to express a personal thank-you to David Wiedenfeld. When each of us on the planning committee had individually taken on more than we thought we could possibly handle, David continued to volunteer for additional duties (often to the chagrin of his boss), and handle them flawlessly. He continued in this spirit when he volunteered to handle the production of the proceedings that you now hold in your hand. I firmly believe his example inspired each of us to do more than we thought we could. Thank you David.

Finally, my heartfelt thanks go to each of you for your attendance and participation in the conference (and for your understanding of my absence). Without your participation, the conference would not have been.

I look forward to seeing each of you in Wisconsin in 2003. Until then,

Russ Horton, Chair
24th Prairie Grouse Technical Council
Oklahoma Department of Wildlife Conservation



Program

Events

Monday, November 5		
Reception	Museum	7:00 - 9:00 pm

Tuesday, November 6		
Lek trip	Departs from Northwest Inn	5:00 am
Scientific Session	Woodward Arts Theater	8:30 am - 5:30 pm
Barbecue	Pioneer Room	6:00 - 9:00 pm

Wednesday, November 7		
Lek trip	Departs from Northwest Inn	5:00 am
Scientific Session	Woodward Arts Theater	8:15 am - noon
Lunch	Cultural Center	Noon - 1:00 pm
Business session	Woodward Arts Theater	1:00 - 3:00 pm
Trade show, dog trainer, and poster session	Pioneer Room	3:00 - 6:00 pm
Banquet bar	Cultural Center	5:30 - 6:30 pm
Banquet	Cultural Center	6:30 - 9:30 pm

Thursday, November 8		
Field trip	Departs from Northwest Inn	8:00 am - 5:00 pm

Scientific Session

TUESDAY, NOVEMBER 6

8:30	Welcome. *ODWC—Greg Duffy*
8:35	Announcements. *D. A. Wiedenfeld*
8:40	Columbian Sharp-tailed Grouse population genetics—preliminary analysis. *K. I. Warheit* and M. A. Schroeder*
9:00	Population genetics of the Sharp-tailed Grouse. *A. W. Spaulding* and K. Mock*
9:20	Genetic variation and structure within and among fragmented populations of Lesser Prairie-Chickens (*Tympanuchus pallidicinctus*). *R. A. Van Den Bussche*, S. R. Hoofer, D. A. Wiedenfeld, D. H. Wolfe, and S. K. Sherrod*
9:40	Loss of genetic variation in Greater Prairie-Chickens following a population bottleneck in Wisconsin. *J. Johnson*, R. Bellinger, P. Dunn, and J. Toepfer*
10:00	Displays of the "guesser" prairie-chicken (*Tympanuchus*). *M. R. Bain*, G. H. Farley, and R. D. Applegate*
10:20	BREAK
10:40	When conservation programs go bad: eastern redcedar distribution in the United States. *A. C. Ganguli*, D. M. Engle, and S. D. Fuhlendorf*
11:00	Land cover and landscape metrics associated with Greater Prairie-Chicken leks in Kansas. *B. E. Flock*, R. D. Applegate, and E. J. Finck*
11:20	Landscape changes in Lesser Prairie-Chicken habitat in the Texas panhandle. *X. B. Wu*, N. J. Silvy, F. E. Smeins, M. J. Peterson, and P. Rho*
11:40	Dispersion of nests in relation to lek locations for Greater Sage-Grouse in north-central Washington. *M. A. Schroeder*
12:00	LUNCH

1:00	Determining effective aspen management strategies to enhance Sharp-tailed Grouse habitat and biological diversity in Manitoba. *J. Froese*, R. Baydack, N. Kenkel, P. Caldwell, and D. Sexton*
1:20	Managing to emulate historic natural landscapes in Canada's Aspen Parkland: an adaptive habitat management research protocol. *D. A. Sexton, R. K. Baydack, N. C. Kenkel, and P. J. Caldwell*
1:40	Sharp-tailed Grouse in Michigan's Upper Peninsula (1946-2000): integrating surveys with multi-species assessment. *R. G. Corace, III*, D. J. Flaspohler, S. J. Sjogren, J. R. Probst, and P. C. Goebel*
2:00	The history of the Society of Tympanuchus Cupido Pinnatus, Ltd. *G. A. Septon*
2:20	"Prairie-Chickens, Grasslands: 2000 and Beyond"—an update. *J. E. Toepfer*
2:40	Translocating prairie grouse: the making of an endangered species? *J. E. Toepfer*
3:00	BREAK
3:30	Population estimation and management of Greater Prairie-Chicken in southeast Nebraska. *J. S. Taylor*
3:50	Review of the historic and current status of the Lesser Prairie-Chicken (*Tympanuchus pallidicinctus*) in Texas. *R. M. Sullivan* and S. Demaso*
4:10	Update on Lesser Prairie-Chicken research in Texas Panhandle. *B. E. Toole, R. S. Jones, M. J. Peterson, N. J. Silvy, and R. M. Sullivan*
4:30	Current status of Lesser Prairie-Chickens north of the Arkansas river in Kansas and efforts to enhance their habitat. *R. D. Rodgers*
4:50	Conservation and management of Lesser Prairie-Chickens: the need for a coordinated approach. *C. E. Braun*

WEDNESDAY, NOVEMBER 7

8:15	Announcements. *D. A. Wiedenfeld*
8:20	Population models for grassland grouse: the comparative demography of arctic and alpine ptarmigan. *B. K. Sandercock*, K. Martin, and S. J. Hannon*
8:40	Survival of Lesser Prairie-Chicken chicks in the sandsage prairie of southwestern Kansas. *J. C. Pitman*, C. A. Hagen, R. J. Robel, G. C. Salter, B. E. Jamison, T. M. Loughin, and R. D. Applegate*
9:00	Lesser Prairie-Chicken demography: a sensitivity analysis of population dynamics in two sandsage prairie fragments in southwestern Kansas. *C. A. Hagen*, J. C. Pitman, R. J. Robel, G. C. Salter, B. K. Sandercock, and R. D. Applegate*
9:20	A recruitment model for Sharp-tailed Grouse on Valentine National Wildlife Refuge. *B. L. Flanders*, G. C. White, and L. L. McDaniel*
9:40	Effects of shrub control and grazing on Lesser Prairie-Chicken reproductive success in New Mexico: Year 0. *D. A. Wiedenfeld*, D. H. Wolfe, and S. K. Sherrod*
10:00	BREAK
10:20	Natal dispersal of Greater Prairie-Chickens in Wisconsin. *D. A. Halfmann*, J. E. Toepfer, and M. W. Blondin*
10:40	Home ranges and movements of radio-tagged Greater Prairie-Chickens in an homogeneous, unbounded tallgrass prairie in northeastern Oklahoma. *D. A. Wiedenfeld*, D. H. Wolfe, and S. K. Sherrod*
11:00	Movements of Lesser Prairie-Chickens in southwestern Kansas. *B. E. Jamison*, R. J. Robel, and R. D. Applegate*
11:20	Vegetation and invertebrate biomass in use and non-use areas of Lesser Prairie-Chicken broods in southwestern Kansas. *G. C. Salter* and R. J. Robel*
11:40	Infectious disease survey of Lesser Prairie-Chickens in northeastern Texas. *M. J. Peterson, P. J. Ferro, M. N. Peterson, R. M. Sullivan, B. E. Toole, and Nova J. Silvy*
12:00	LUNCH

PGTC Field Trip - 8 November 2001

0730 - Start Loading Buses

0800 - Depart for McAslin Ranch

0830 - Arrive at McAslin Ranch (**Stop 1**)
Stephanie Harmon, Bob Gillen, and Don Wolfe will discuss shinnery oak habitat.

0900 – Depart for Cooper Wildlife Management Area

0930 – Arrive at Cooper Wildlife Management Area (**Stop 2**)
Eddie Wilson and Sam Fuhlendorf will discuss sand sagebrush habitat and patch burning. Eddie will also discuss Lesser Prairie-Chicken history and numbers on Cooper WMA. A spring 2001 prescribed burn will be demonstrated. A sagebrush roller/chopper, used for sand sagebrush management, will also be demonstrated.

1030 – Depart for Collier Ranch

1100 – Arrive at Collier Ranch (**Stop 3**)
Stephanie Harmon and Bob Gillen will discuss eastern red cedar encroachment and the use of prescribed fire for cedar control. A spring 2001 prescribed burn will be demonstrated. Stephanie will discuss USFWS Candidate Conservation Agreements with Assurances. Stephanie and Bob will also discuss cross fencing and grazing regimes.

1145 – Depart for Laverne

1230 – Arrive at Laverne City Park for lunch (**Stop 4**)

1330 – Depart for Carnagey Ranch

1400 – Arrive at Carnagey Ranch (**Stop 5**)
Don Wolfe will demonstrate Lesser Prairie-Chicken traps and discuss research efforts. Mike Blondin and Celeste McKnight will demonstrate radio-tracking equipment. Marvin Carnagey, Dan O'Hair, and Kenny Knowles will discuss prairie-chickens, farming, and ranching.

1500 – Move to O'Hair Ranch (**Stop 6**)
Marvin Carnagey, Dan O'Hair, and Kenny Knowles will continue their discussions, and Dan will demonstrate food plots. Around 100 Lesser Prairie-Chickens can be seen coming to the food plots to feed in the afternoons or evenings, so watch for them.

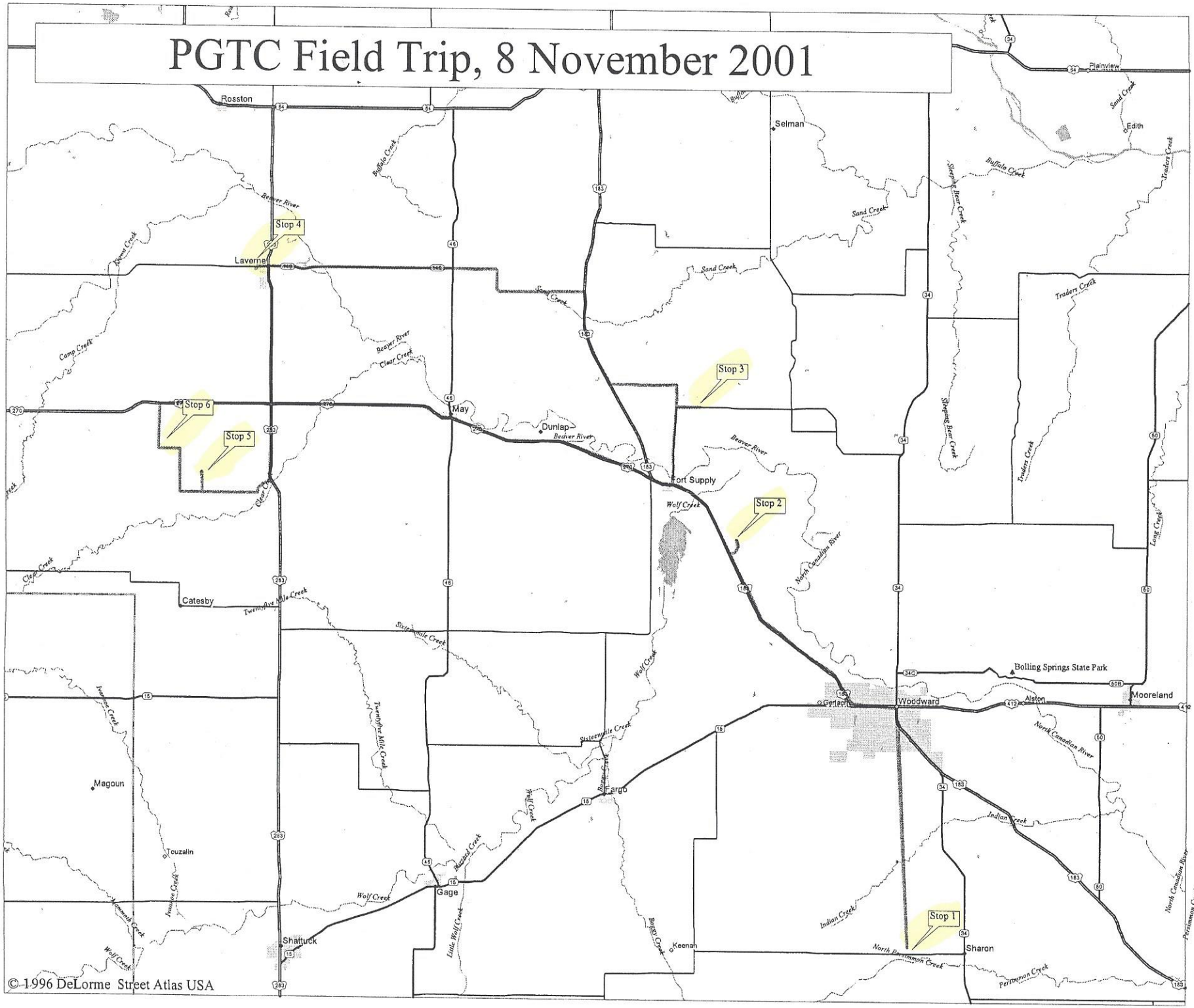
1545 – Depart for Woodward

1645 – Arrive back at Woodward

Please not that restroom facilities will be available ONLY at the Laverne City Park. Please use the bus restrooms for the rest of the trip.

A light jacket is recommended.

PGTC Field Trip, 8 November 2001



Abstracts

Presentations

COLUMBIAN SHARP-TAILED GROUSE POPULATION GENETICS—PRELIMINARY ANALYSIS.

KENNETH I. WARHEIT*, Dept. Fish and Wildl., Olympia, WA 98501 USA; and MICHAEL A. SCHROEDER, Dept. Fish and Wildl., Bridgeport, WA 98813 USA.

The historical range of the Columbian Sharp-tailed Grouse (*Tympanuchus phasianellus columbianus*) extended from the steppe- and shrub-dominated habitats in the inter-mountain regions from British Columbia south to California, Nevada, and Utah, and east to western Montana, Wyoming and

Colorado. The species has been extirpated from most of its range and exists now as remnant and isolated populations. We conducted a preliminary analysis of the genetic structure of three of these populations (Washington, n=19; SE Idaho, n=31, Montana-west of the divide [MTW], n=3). Also included in the analysis were samples from the Alaska subspecies (n=3) and from Montana, east of the divide [MTE; Plains subspecies] (n=5). Analyses of seven microsatellite loci suggest significant genetic structuring among the five geographic areas, with all populations, except MTW, showing significant pairwise differentiation. Of the three Columbian localities, Washington and MTW were most similar genotypically. The Idaho samples appeared more similar to the MTE and Alaska samples than to the Washington or MTW samples, although no definitive conclusion concerning phylogeography should be based on this analysis. The Washington population has lower genetic diversity compared with that of the Idaho population, and appears fragmented with theta values as high as 0.06 at geographic scales as small as 2 km, compared with theta values of 0.00 at scales upward of 45 km in the Idaho population.

POPULATION GENETICS OF THE SHARP-TAILED GROUSE.

A. W. SPAULDING*, Dept. of Biology, Utah State Univ., Logan, UT 84322 USA, and K. MOCK, Fisheries and Wildlife Dept., Utah State Univ., Logan, UT 84322 USA.

As a result of human settlement and agriculture, the Sharp-tailed Grouse has suffered a huge reduction in its range. Presently, this species receives the attention of land managers, particularly in the U.S. Although there are designated subspecies, it is not known whether these names reflect genetically distinct groups within the species, or what the relationships might be among any such groups. Initial investigations by Ellsworth et al. (Auk, vol. 111, no. 3, pp. 661-671, 1994) suggest that there are not major genetic differences within or among *Tympanuchus* species across

large geographic distances. We have initiated an effort to extend this work, using highly sensitive DNA techniques (AFLP and sequencing) and sampling across the entire range of the species. With the cooperation of many land managers, game managers, landowners, and hunters, we have initiated our sampling efforts this fall. Progress and preliminary results will be reported. The results of this study should be valuable to game managers making decisions about translocations, hunting regulations and habitat management for Sharp-tailed Grouse.

GENETIC VARIATION AND STRUCTURE WITHIN AND AMONG FRAGMENTED POPULATIONS OF LESSER PRAIRIE-CHICKENS (*TYMPANUCHUS PALLIDICINCTUS*).

RONALD A. VAN DEN BUSSCHE* and STEVEN R. HOOFER, Department of Zoology, Collection of Vertebrates, and Oklahoma Cooperative Fish and Wildlife Research Unit, Oklahoma State University, Stillwater, OK 74078 USA, DAVID A. WIEDENFELD, DONALD H. WOLFE, and STEVE K. SHERROD, Sutton Avian Research Center and Oklahoma Biological Survey, P.O. Box 2007, Bartlesville, OK 74005 USA.

The Lesser Prairie Chicken (*Tympanuchus pallidicinctus*) has shown marked declines in recent years and its range has become fragmented. The isolated, small populations are at risk for loss of genetic diversity and increased inbreeding due to population bottlenecks and decreased gene flow. To examine the consequences of fragmentation and limited dispersal on patterns of genetic structure, we examined six microsatellite loci and mtDNA sequence variation from Lesser Prairie-Chickens collected in western Oklahoma and eastern New Mexico. Preliminary results indicate high levels of microsatellite allelic and mtDNA haplotypic diversity. Moreover, 10.85% and 6.23% of the genetic variation detected at microsatellite loci and among mtDNA sequences, respectively, is partitioned among collecting localities. For

both classes of loci, most genetic differentiation can be attributed to differences between Oklahoma and New Mexico populations. We conclude from these that these populations are not suffering the effects of inbreeding due to low levels of genetic variation, as may be expected based on their highly fragmented and disjunct distributions.

LOSS OF GENETIC VARIATION IN GREATER PRAIRIE-CHICKENS FOLLOWING A POPULATION BOTTLENECK IN WISCONSIN.

JEFF JOHNSON*, RENEE BELLINGER, and PETER DUNN, Dept. Biological Sciences, Univ. Wisconsin-Milwaukee, P.O. Box 413, Milwaukee, WI 53201, USA, and JOHN TOEPFER, Society of Tympanuchus Cupido Pinnatus, 3755 Jackson Ave. Plover, WI 54467, USA.

A recent study of Greater Prairie-Chickens in Illinois found an association between the loss of genetic variation and hatching success following a population bottleneck. Prairie-chickens also went through a population bottleneck in Wisconsin where they are currently listed as threatened. From 1951 to 1961 the population declined 50% and it has remained at low but fluctuating levels for the past 40 years. To determine if prairie-chicken populations in Wisconsin lost genetic variation during this population bottleneck, we compared microsatellite DNA variation in historic (1951) and present-day (1996-99) populations using six loci. Population mean heterozygosity and number of alleles per locus were significantly lower in the late 1990s than in 1951. Sixteen alleles were detected in the historic but not in the present-day population and, thus, were apparently lost during the population bottleneck. As in the Illinois study, we found a reduction in genetic variation following a population bottleneck; however, preliminary evidence suggests that there has not been a reduction in hatching success in Wisconsin, as was found in Illinois. We discuss several potential reasons for this difference between studies.

DISPLAYS OF THE "GUESSER" PRAIRIE-CHICKEN (*TYMPANUCHUS*).

M. R. BAIN*, G. H. FARLEY, Dept. of Biological Sciences, Fort Hays State Univ., Hays, KS 67601 USA, and R. D. APPLEGATE, Kansas Dept. of Wildlife and Parks, Emporia, KS 66801 USA.

Greater (*Tympanuchus cupido*) and Lesser (*T. pallidicinctus*) prairie-chickens are considered to be historically and presently allopatric. We recorded male prairie-chicken display booms unlike typical greater and lesser booms at mixed greater / lesser leks in western Kansas. Spectrograms of these vocalizations contain elements of greater and lesser booms and multivariate analyses suggest intermediate similarity. These males displayed additional novel characters and novel combinations of greater and lesser characters. Although hybridization is suspected, until further analysis the term "guesser" will be used because of the possibility of vocal learning.

WHEN CONSERVATION PROGRAMS GO BAD: EASTERN REDCEDAR DISTRIBUTION IN THE UNITED STATES.

AMY C. GANGULI*, DAVID M. ENGLE, and SAMUEL D. FUHLENDORF, Oklahoma State University, Stillwater, OK 74078-6028 USA.

The greatest threat to wildlife populations is habitat loss. Although most state and federal management agencies pledge to combat habitat loss, some of the activities they encourage may reduce habitat. Each year state conservation agencies operate programs that include seedling distribution and planting of species, some of which are invasive, such as eastern redcedar. Research has demonstrated the negative consequences of eastern redcedar encroachment on grassland ecosystems and wildlife habitat. Our objective was to

evaluate the extent of eastern redcedar distribution programs throughout the United States, identify the major uses for the seedlings and determine the longevity of the distribution programs. Nurseries and state agencies were asked a series of questions about their seedling distribution practices. Of the 36 states we contacted, 23 distribute eastern redcedar. The estimated number of seedlings distributed in 2001 was 2.3 million. Major uses for the seedlings include windbreaks, shelterbelts, wildlife habitat, mine reclamation, CRP plantings, and privacy fencing. Most of the states that sell over 50,000 seedlings/year have been in operation for over 40 years and Nebraska, the oldest nursery, has been actively distributing for 76 years. Extensive planting of eastern redcedar throughout the United States is augmenting habitat loss. This ironic contradiction, that conservation agencies are actively contributing to resource degradation through willful biopollution, deserves immediate, active intervention to curtail the practice.

LAND COVER AND LANDSCAPE METRICS ASSOCIATED WITH GREATER PRAIRIE-CHICKEN LEKS IN KANSAS.

BRIAN E. FLOCK*, Department of Biological Sciences, Emporia State University, Emporia, KS, 66801 USA, ROGER D. APPLEGATE, Kansas Department of Wildlife and Parks, Emporia, KS 66801 USA, and ELMER J. FINCK, Department of Biological Sciences, Fort Hays State University, Hays, KS 67601 USA.

Largely due to changes in agriculture, habitat fragmentation, and habitat loss, Greater Prairie-Chicken (*Tympanuchus cupido*) populations have been declining in many parts of their range since the early 1900s. Greater Prairie-Chickens are often associated with large tracts of grassland because they provide much of the essential habitat requirements needed for survival. Using classified Landsat satellite images, we

examined the land cover and landscape metrics associated with Kansas Greater Prairie-Chicken leks. Using ArcView Patch Analyst, we examined land cover associations within two buffer distances 1.6 km and 4 km. Landscape metrics were calculated within a 1.6 km buffer. Preliminary discriminant function analysis suggests that the amount of cropland, forest and grassland within the buffer can be used to classify lek and random points 89.1% of the time. Within the 4 km buffer we found that amount of grassland can predict lek sites from random points 88.2% of the time. Using grassland and cropland patch metrics, we found that lek points can be predicted 90.5 % of the time. Our findings suggest that not only is the amount of grassland essential for prairie chickens but also its configuration within the landscape.

LANDSCAPE CHANGES IN LESSER PRAIRIE-CHICKEN HABITAT IN THE TEXAS PANHANDLE.

X. BEN WU, NOVA J. SILVY*, FRED E. SMEINS, MARKUS J. PETERSON, and PAIKHO RHO, Texas A&M University, College Station, TX 77843 USA.

The objective of this study was to determine landscape patterns and changes associated with lesser prairie chicken (LPCH; *Tympanuchus pallidicinctus*) habitat in the Texas Panhandle. We used remote sensing, geographic information system, and landscape analysis in order to seek quantifiable explanations for the absence of the LPCH from its formerly inhabited range. We developed historical land-cover data based on aerial photos for six intensive study areas in the Texas Panhandle for the 1940's and 1990's. We then conducted landscape analyses to assess the changes in landscape composition and spatial patterns related to LPCH habitat over the five decades and their possible relationship to the contraction of areas occupied by LPCH. Landscape composition and spatial pattern remained relatively unchanged in areas where LPCH populations remained stable (1940-1989). Landscape changes in both the High Plains (dominantly fragmentation of rangelands by increased

cropland cover) and Rolling Plains (dominantly fragmentation of non-woody vegetation in rangelands by increased woody cover) contributed to the loss of LPCH habitat. Gains in LPCH populations in 1989 appeared to be on areas suitable for LPCH in 1940. Based on multivariate analyses of landscape attributes, the spatial distribution of landscape clusters resembled the level of suitability of habitat for the distribution of LPCH populations. This suggests that remote sensing-based landscape analysis can be an effective approach for LPCH habitat assessment, monitoring, and restoration.

DISPERSION OF NESTS IN RELATION TO LEK LOCATIONS FOR GREATER SAGE-GROUSE IN NORTH-CENTRAL WASHINGTON.

M. A. SCHROEDER, Washington Department Fish and Wildlife, P. O. Box 1077, Bridgeport, WA 98813 USA.

Management guidelines for prairie grouse in general, and greater sage-grouse (*Centrocercus urophasianus*) in particular, often recommend using lek locations to predict critical nesting areas. For example, sage-grouse management guidelines published in 1977 recommend treating all habitat within 3.2 km of a lek location as potential breeding habitat. This recommendation was based on research showing that most females nest relatively close to leks. Although research in Idaho has shown that females select nest locations independent of lek locations, most Idaho females still nest < 3.2 km from the nearest lek. Because most previous research on Greater Sage-Grouse was in relatively continuous habitat, I examined the dispersion of nests in relation to lek locations in a highly fragmented area of north-central Washington. A total of 204 nests for 82 females were observed during 1992-1998. The average distance between nests and the lek where each female was captured was 7.8 km and the average distance to the nearest lek was 5.1 km. About 72% of the nests were > 3.2 km from the nearest lek. The average distance between 1,412 random points and the nearest lek was 5.3 km, not significantly different than the average distance between

actual nests and the nearest lek. The relatively large distances between nest and lek locations appear to be related to the highly fragmented habitat. These results indicate that identification of nesting habitat in north-central Washington may require a technique different than the delineation of management areas around lek locations.

DETERMINING EFFECTIVE ASPEN MANAGEMENT STRATEGIES TO ENHANCE SHARP-TAILED GROUSE HABITAT AND BIOLOGICAL DIVERSITY IN MANITOBA.

J. FROESE* and R. BAYDACK, Natural Resources Inst., Univ. of Manitoba, Winnipeg, MB R3T 2N2 Canada, N. KENKEL, Dept. of Botany, Univ. of Manitoba, Winnipeg, MB R3T 2N2 Canada, P. CALDWELL, Wildlife Landscapes, 1484 Charleswood Road, Winnipeg, MB R3S 1B9 Canada, and D. SEXTON, Ducks Unlimited Canada, Oak Hammock Marsh, Stonewall, MB, ROC 2Z0 Canada.

The lack of historical natural disturbances such as fire and bison grazing in recent decades has caused a loss of diversity in the vertical structure of the plant community due to aspen (*Populus tremuloides*) encroachment. Decreased habitat diversity has altered the habitat condition to the general detriment of many wildlife species, including Sharp-tailed Grouse. The purpose of this study is to identify the most biologically effective technique for controlling aspen regrowth in order to restore historic habitat diversity by emulating natural disturbance. The methods include: fire, herbicide, mowing, and bark scraping. The treatments were set up in a randomized block design, and a 6x4 sampling grid was used to enumerate the aspen. Fire was the most effective treatment in killing aspen woody stems, but resulted in significant new shoot production. Herbicide had fewer new shoots than the scraped treatment, but similar resprout production. Mowing resulted in many new shoots produced, and the greatest number of resprouts. An intense fire, followed by a short rotational grazing strategy may be the most biologically

effective treatment. However, another field season of data needs to be analyzed to confirm this.

MANAGING TO EMULATE HISTORIC NATURAL LANDSCAPES IN CANADA'S ASPEN PARKLAND: AN ADAPTIVE HABITAT MANAGEMENT RESEARCH PROTOCOL.

D. A. SEXTON, P.O. Box 1160, Stonewall, MB, ROC 2Z0 Canada, R. K. BAYDACK, Natural Resources Inst., Univ. of Manitoba, Winnipeg, MB, R3T 2N2 Canada, N. C. KENKEL, Dept. of Botany, Univ. of Manitoba, Winnipeg, MB, R3T 2N2 Canada, and P. J. CALDWELL, Wildlife Landscapes, Winnipeg, MB, R3S 1B9 Canada.

The Canadian Aspen Parkland is a unique ecotone of intermixed prairie and woodland, which was historically maintained by fire, bison and climatic extremes. Sharp-tailed Grouse were once an abundant wildlife species here. With control of wildfire and confined livestock grazing or land clearing, the Parkland's uncultivated portion has been invaded by aspen, and wildlife characteristic to the area, including sharptails, have declined. A suspected loss in biological diversity has also resulted from this new 'unnatural' situation. Land managers, especially livestock operators, have attempted to manage aspen by a variety of means including mechanical, chemical, and adjustment of grazing pressure. Most of these methods, however, ignore historical vegetation boundaries. This paper discusses the present approaches, and the potential to use remotely sensed aerial information to apply these as well as other management techniques in a way that more closely follows historical patterns of vegetation composition (i.e., equal proportions of woodland to shrubland to grassland). A proposal to evaluate the effect on vegetative as well as wildlife components over large areas (i.e., sampling within the entire Canadian Aspen Parkland landscape) and over a relatively long time period (i.e., > 10 years) is being developed in association with Agriculture and Agri-Food Canada's Prairie Farm Rehabilitation Administration, and a

not-for-profit agency, the Sharptails Plus Foundation. Initial planning for this project will be described, along with a design for evaluation.

SHARP-TAILED GROUSE IN MICHIGAN'S UPPER PENINSULA (1946-2000): INTEGRATING SURVEYS WITH MULTI-SPECIES ASSESSMENT.

R. G. CORACE, III* and D. J. FLASPOHLER, School of Forestry and Wood Products, Michigan Tech. Univ., Houghton, MI 49931 USA, S. J. SJOGREN, U.S.F.S., Hiawatha Nat. Forest, St. Ignace, MI 49781 USA, J. R. PROBST, U.S.F.S., North Cent. Forest Exp. St., Rhinelander, WI 54501 USA, P. C. GOEBEL, School of Natural Resources, OARDC, Wooster, OH 44691 USA.

We present findings from the first two years of a renewed monitoring of the Sharp-tailed Grouse (*Tympanuchus phasianellus*) population in Michigan's Upper Peninsula and provide a multi-species avian assessment of landscapes inhabited by sharptails. Using established protocols, we counted a total of 602 sharptails in 1999 and 498 in 2000. Results suggest a regionally increasing sharptail population when corrections for survey effort are factored into our surveys and into Michigan Department of Natural Resources long-term population data (1946-96). Sharptail abundance is evenly distributed between agricultural lands and native xeric ecosystems (e.g., pine barrens) and does not differ between years ($\chi^2 = 3.8$, df = 1, P = 0.05). Moreover, no significant difference (P > 0.05) is found when mean lek size is compared between these two habitat types. Fourteen other listed avian species were found in landscapes inhabited by sharptails. Throughout the region, low intensity farming and the restoration of pine barren ecosystems through the use of prescribed fire and even-aged timber management provide important, if not critical, habitat for sharptails and other openland bird species of conservation concern.

THE HISTORY OF THE SOCIETY OF TYMPANUCHUS CUPIDO PINNATUS, LTD.

G. A. SEPTON, Milwaukee Public Museum, Milwaukee, WI 53233 USA.

This presentation will chronicle the formation, growth and influence of the Society of Tympanuchus Cupido Pinnatus, Ltd. in Wisconsin. From a chance encounter of two like-minded conservationists in 1960 to the present, this paper will highlight the organization's accomplishments over the past 40 years from helping to save the prairie-chicken from extirpation in Wisconsin to funding threatened and endangered species projects. Also included will be commentary on the Society's current research project, Prairie Chickens and Grasslands: 2000 & Beyond.

"PRAIRIE-CHICKENS, GRASSLANDS; 2000 AND BEYOND" – AN UPDATE.

J. E. TOEPFER, Society of Tympanuchus Cupido Pinnatus, Ltd., 3755 Jackson Ave., Plover, WI 54467 USA.

This paper will present an overview of the field research project "Prairie Chickens, Grasslands: 2000 and Beyond," sponsored by the Society of Tympanuchus Cupido Pinnatus, Ltd. The objective is simple and broad—increase our knowledge and understanding of prairie-chicken ecology and grassland management. This project consists of several interrelated field research projects in North Dakota, Minnesota, and Wisconsin that utilized radio telemetry to monitor survival, general habitat use, dispersal of young and nesting success. We are also attempting to establish base line data for Wisconsin, Minnesota, and the re-established population in North Dakota on predation, disease, open space, parasites, pesticides, accidents, winter food, and genetics.

TRANSLOCATING PRAIRIE GROUSE: THE MAKING OF AN ENDANGERED SPECIES?

J. E. TOEPFER, Society of Tympanuchus Cupido Pinnatus, Ltd., 3755 Jackson Ave., Plover, WI 54467 USA.

Since 1950 there have been at least 55 attempts to establish prairie grouse populations in North America. Most have failed or only established temporary populations. This paper updates efforts during the past ten years while focusing on two prairie-chicken translocation projects, one in North Dakota 1992-98, the other started in 1999 in southwestern Minnesota. Both of projects utilized a summer release, which involves trapping birds during the breeding season, radio-tagging them, and then recapturing them for translocation during the molt of flight feathers during the summer. Prairie-chickens released at this time have a higher establishment rate because it reduces the larger wandering movements made by birds translocated during the breeding season. Hence fewer birds need to be translocated. The results of the North Dakota and Minnesota translocations have been encouraging. A booming ground survey in North Dakota in 2000 found 174 cocks on 19 booming grounds and 96 cocks in 2001 on 13 booming grounds. The dramatic decline, 44.5% in 2001 was due to catastrophic rains, 17 inches in 24 hours that flooded nests and killed adult birds. All of the initial booming grounds were established within 1.6 km of the release. Efforts began in 1999 to re-establish a prairie chicken population in southwestern Minnesota using the techniques developed in North Dakota. However, only two booming grounds have been established within 1.6 km of six different release sites.

POPULATION ESTIMATION AND MANAGEMENT OF GREATER PRAIRIE-CHICKEN IN SOUTHEAST NEBRASKA.

J. SCOTT TAYLOR, Nebraska Game and Parks Commission, Lincoln, NE 68503 USA.

Greater Prairie-Chicken in southeast Nebraska comprise the northern-most extension of the Flint Hills population of Kansas and Oklahoma, and had not been legally hunted since 1930. Apparent increases in prairie-chicken distribution and abundance in several southeast Nebraska counties during the early 1990s led managers to collect more detailed data on these parameters. Extensive surveys in 1995 revealed >100 booming grounds in Johnson and Pawnee counties alone, suggesting a fall population of 4,000-5,000 birds. The primary habitat change coinciding with population expansion was the creation of Conservation Reserve Program grasslands, most of which were smooth brome (*Bromus inermis*). Results from standardized booming ground survey routes in five southeast counties suggested a stable regional population during 1996-2000. A limited-permit-based hunting season was enacted in eastern Nebraska for the fall of 2000, which proved to be controversial. A similar season was enacted in 2001, but better information exchange with key hunt opponents helped reduce controversy. Managers will continue to explore ways of promoting a stable prairie-chicken population in the region while providing appropriate levels of recreational opportunity.

REVIEW OF THE HISTORIC AND CURRENT STATUS OF THE LESSER PRAIRIE-CHICKEN (*TYMPANUCHUS PALLIDICINCTUS*) IN TEXAS.

ROBERT MILES SULLIVAN*, Texas Parks & Wildlife (Region I, District 2), P.O. Box 659, Canyon TX 79105 USA and STEVE DEMASO, Texas Parks & Wildlife, 4200 Smith School Road, Austin, TX 78744-3291 USA.

Historically, the Lesser Prairie-Chicken (*Tympanuchus pallidicinctus*) occurred in sandy rangeland throughout the northeastern and southwestern (Permian Basin) regions of the Texas Panhandle. Analyses of the historic distribution showed a large reduction in the range of the species in Texas between 1963 and 1980 (78% or 1,070,426 ha), particularly in the southwestern and east-central panhandle, whereas populations

in the northeastern Panhandle remained relatively stable. In the northeastern Panhandle, average number of males per lek increased since 1942. In the southwestern Panhandle, average numbers of males per lek decreased dramatically from 1969 to 1981 and from 1985 to 2001, but there was no decline in the northeastern or southwestern panhandle regions from 1990 to 2001. Over the last decade numbers of males per lek in the northeastern Panhandle were 6.6% below the 1942-89 average, but in the southwestern Panhandle they were 54.9% below the 1969-89 average. In the northeastern Panhandle, leks per unit area increased from 1952 to 1986 on the Hemphill County study area and from 1952 to 1974 on the Wheeler County study area. On the Wheeler County study area this statistic declined precipitously from 1974 to 1985. The 1997-2001 lek per unit area average for the Hemphill County study area was 4.1% above the 1942-86 average, but was 89.5% below the 1997-2001 average in the Wheeler County study area. Small expansions of range occurred in Bailey, Cochran, Gray, Hemphill, Lipscomb, Terry, and Wheeler counties resulting from increased regional conservation efforts, newly established landowner incentive programs, and partnerships between state and federal resource agencies and private landowners. Recent research and factors hypothesized to have affected declines in size of populations of the Lesser Prairie-Chicken in Texas are discussed.

UPDATE ON LESSER PRAIRIE CHICKEN RESEARCH IN TEXAS PANHANDLE.

BENJAMIN E. TOOLE, RYAN S. JONES, MARKUS J. PETERSON, and NOVA J. SILVY, Department of Wildlife and Fisheries Sciences, Texas A&M University, TAMU-2258, College Station, TX 77843-2258 USA, and ROBERT M. SULLIVAN, Texas Parks and Wildlife Department, P.O. Box 659, 5900 Cemetery Road, Canyon, Texas 79015, USA.

Currently, the Lesser Prairie-Chicken (LPCH; *Tympanuchus pallidicinctus*) occupies two general locations in the

Panhandle of Texas. Most LPCH research within Texas has been conducted in the shinnery oak (*Quercus havardii*) grasslands in the southwestern portion (Permian Basin, High Plains) of the Panhandle. The other location, consisting of areas of sand sagebrush (*Artemisia filifolia spp.*) and areas of shinnery oak, is the northeastern portion (Rolling Plains) of the Panhandle along the Texas-Oklahoma line. This paper describes our current research on LPCH in Wheeler and Hemphill counties of the northeastern Panhandle. The Wheeler County site is dominated by shinnery oak, whereas the Hemphill site is dominated by sandsage. A total of 49 LPCH (29 on the Hemphill site and 20 on the Wheeler site) was captured and 46 (26 Hemphill and 20 Wheeler) fitted with radio collars to evaluate survival, movements, nest site selection, and habitat use. The first six months survival was nearly 72% for all birds radio tracked. Of 19 females radio-tracked, ten were known to nest, one hen was known to re-nest, and six nests successfully hatched. One nest was destroyed by cattle, one nest was abandoned, one hen was killed on a nest, and two hens were killed after their nests had hatched (broods were assumed lost). Data regarding hatch success (60%) was limited to the Hemphill site. Only two females attempted to nest at the Wheeler site and both nests failed to produce a successful hatch. Fall and winter activities will focus on additional trapping and radio collaring.

CURRENT STATUS OF LESSER PRAIRIE CHICKENS NORTH OF THE ARKANSAS RIVER IN KANSAS AND EFFORTS TO ENHANCE THEIR HABITAT.

R. D. RODGERS, Kansas Dept. of Wildlife and Parks, Hays, KS 67601 USA.

Since the presence of Lesser Prairie-Chickens north of the Arkansas River was first confirmed in 1997 and 1998, an intensified effort has been made to locate additional leks in this region. As of the spring of 2001, Kansas Department of Wildlife and Parks personnel and other volunteers have audibly located 165 sites where Lesser Prairie-Chickens were

displaying north of the Arkansas River. Lesser Prairie-Chickens have been found in 19 of the 23 counties north of the Arkansas River that were part of the historic breeding range. Tree encroachment on prairies is believed to be preventing their occupation of the remaining four counties, all of which are on the eastern margin of the historic range. A few LPCH have been located north of what was previously considered the northern margin of their historic breeding range. Mixed leks with both Lesser and Greater Prairie-Chickens are relatively common in an overlap zone approximately 65 km (40 miles) wide. Unusual sounding calls from a few mixed leks were first detected in the spring of 2000 and lesser-greater hybrids were confirmed in 2001. Evidence continues to suggest that Conservation Reserve Grasslands have provided the stimulus for this expansion of Lesser Prairie-Chickens in Kansas. Lesser leks have been located in some areas with little or no remaining grassland except CRP. Conservation Priority Areas have added many tens of thousands of acres of CRP within the Lesser Prairie-Chicken's Kansas range which would, otherwise, not be present. Efforts to enhance the value of CRP habitat for chickens are focusing on interseeding of alfalfa and native forbs in existing stands, inclusion of forbs in new stands, and better maintenance of all CRP. Research conducted in the summer of 2001 showed greatly-enhanced insect production in interseeded CRP stands.

CONSERVATION AND MANAGEMENT OF LESSER PRAIRIE-CHICKENS: THE NEED FOR A COORDINATED APPROACH.

CLAIT E. BRAUN, Grouse Inc., 5572 No. Ventana Vista Rd., Tucson, AZ 85750 USA.

Lesser Prairie-Chickens (*Tympanuchus pallidicinctus*) historically occurred in at least five states in the southern Great Plains with an estimated population > 2,000,000 birds. This species has been extirpated from > 90% of its original distribution. Present estimates of numbers of breeding birds are: Colorado < 1,500, Kansas < 8,000, Oklahoma < 3,000,

New Mexico < 3,000, and Texas < 5,000. Thus, there has been a decrease in total population size of > 99%. These obvious problems led to a petition in 1995 to list the Lesser Prairie-Chicken as threatened under the federal Endangered Species Act. The finding on the petition by the U.S. Fish and Wildlife Service in 1998 was "warranted but precluded." The factors (habitat loss, degradation, and fragmentation) that contributed to the documented decline in distribution and abundance are obvious. What is not obvious is the will of state wildlife agencies to work cooperatively to prevent the extinction of the species. This species lacks an effective working group to promote its conservation. Further, there is a lack of coordination of efforts among state and federal agencies, a research focus on the obvious, and a lack of management experiments to test strategies to benefit the species. Finally, it is clear if the species is to survive, there will be a need for large blocks of lands dedicated solely to management for Lesser Prairie-Chickens. This management will also need to involve movement of birds among the larger land parcels.

POPULATION MODELS FOR GRASSLAND GROUSE: THE COMPARATIVE DEMOGRAPHY OF ARCTIC AND ALPINE PTARMIGAN.

BRETT K. SANDERCOCK*, Div. Biology, Kansas State Univ., Manhattan, KS 66506 USA, KATHY MARTIN, Dept. Forest Sciences, Univ. British Columbia, Vancouver, BC V6T 1Z4 Canada, and SUSAN J. HANNON, Dept. Biological Sciences, Univ. Alberta, Edmonton, AB T6G 2E9 Canada.

Arctic and alpine habitats are harsh environments that are likely to affect evolution of life history traits in terrestrial vertebrates. To investigate the effects of stringent ecological conditions on grouse demography, we compared three populations of ptarmigan breeding along a gradient of environmental conditions. Female Willow Ptarmigan and White-tailed Ptarmigan breeding at alpine and subalpine sites had smaller clutches, and lower probabilities of nesting

success, fledging success, and renesting than Willow Ptarmigan at a low elevation arctic site. Reproductive output and adult mortality rates were ranked: alpine < subalpine < arctic, with little overlap among sites. Age structure of vital rates also differed among sites, with no significant age differences at the arctic site, age differences in components of reproduction among subalpine birds, and age-specific variation in reproduction and adult survival at the alpine site. Matrix models predicted stable population numbers for both Willow Ptarmigan populations (lambda = 1.0) and declines in White-tailed Ptarmigan (lambda = 0.7). Juvenile survival had the highest elasticity at all sites, and rates of population change were most sensitive to variation in this rate. However, fecundity rates of 1-year breeders had high elasticity in Willow Ptarmigan, whereas survival rates of older females were more important in White-tailed Ptarmigan. These differences suggest that the effects of global warming, harvesting and other perturbations will differ among arctic and alpine grouse, possibly in predictable ways.

SURVIVAL OF LESSER PRAIRIE-CHICKEN CHICKS IN THE SANDSAGE PRAIRIE OF SOUTHWESTERN KANSAS.

J. C. PITMAN*, C. A. HAGEN, R. J. ROBEL, G. C. SALTER, Division of Biology, Kansas State University, Manhattan, KS 66506-4901 USA, B. E. JAMISON, USGS Northern Prairie Wildlife Research Center, Jamestown, ND 58401 USA, T. M. LOUGHIN, Department of Statistics, Kansas State University, Manhattan, KS 66506-0802 USA, and R. D. APPLEGATE, Kansas Department of Wildlife and Parks, Research and Survey Office, Emporia, KS 66801-1525 USA.

Recruitment into grouse populations is critical to their persistence and little is known about the survival of Lesser Prairie-Chicken (LPCH) (*Tympanuchus pallidicinctus*) chicks. We used flush counts and radio telemetry to estimate recruitment rates. LPCH broods (n = 33) were flushed

systematically to determine chick survival. Daily survival rates ($\hat{DSR}$) were estimated for pre-fledge (hatch to 14 days) and post-fledge (14-60 days) periods from flush counts. Pre-fledge $\hat{DSR}$ was 0.949 and post-fledge $\hat{DSR}$ was estimated at 0.977. Overall chick survival from hatch to 60 days was 0.168. Additionally, 15 LPCH chicks from eight broods were equipped with transmitters and monitored daily. Individual chick survival estimates from 60 days post-hatch to first breeding (March 31) was 0.467. Overall chick survival from hatch to first breeding was estimated at 0.078. This low chick survival rate is insufficient to maintain LPCH populations in southwestern Kansas. Therefore, it is imperative that the factors contributing to this low survival rate be determined so that management practices can be implemented to increase chick survival. Regression analyses were used to determine relationships between daily survival rates of LPCH chicks and the structure of sand sagebrush (*Artemisia filifolia*) stands within a brood's home range. Sagebrush density was the only variable significantly related to chick daily survival. Broods occupying moderately dense (4,000-6,000 plants/ha; approximately 15-20% canopy cover) stands of sagebrush had the highest daily survival rates whereas broods in stands of lower and higher density had the lowest daily survival rates.

LESSER PRAIRIE-CHICKEN DEMOGRAPHY: A SENSITIVITY ANALYSIS OF POPULATION DYNAMICS IN TWO SANDSAGE PRAIRIE FRAGMENTS IN SOUTHWESTERN KANSAS.

C. A. HAGEN*, J. C. PITMAN, R. J. ROBEL, G. C. SALTER, B. K. SANDERCOCK, Division of Biology, Kansas State University, Manhattan KS 66506 USA, and R. D. APPLEGATE, Kansas Department of Wildlife and Parks, Emporia KS 66801 USA.

Recently it has been suggested that nest success and chick survival are the main limiting factors for populations of Lesser

Prairie-Chicken (*Tympanuchus pallidicinctus*) in the sand sagebrush (*Artemisia filifolia*) prairie of southwestern Kansas. We examined this hypothesis using elasticity analysis on an age specific projection matrix. The model was parameterized with demographic data from a field study of Lesser Prairie-Chickens near Garden City, KS. We draw upon data gathered from hens radio-marked since 1998 (hens $n = 196$; nests $n = 135$; broods $n = 38$). Additionally, we compared the projection matrices of two spatially implicit populations to examine the contributions of the vital rates to the difference in the rate of population change between these fragments of contrasting human disturbance and sand sagebrush communities. The arithmetic rate of population change (λ) was less than 1.0 for both populations ($\lambda_1 = 0.653$, $\lambda_2 = 0.887$). This indicates a short-term decline in population growth in the absence of immigration. However, the marked contrast in λ between populations yielded differences in sensitivity to various life-stages. We discuss the application of this analysis to management of the sand sagebrush habitat that will target the critical life-history stages in these two populations.

A RECRUITMENT MODEL FOR SHARP-TAILED GROUSE ON VALENTINE NATIONAL WILDLIFE REFUGE.

B. L. FLANDERS* and G. C. WHITE, Colorado State University, Department of Fishery and Wildlife Biology, Fort Collins, CO 80523-1474 USA, and L. L. McDANIEL, Valentine National Wildlife Refuge, HC37 Box 37, Valentine, NE 69201 USA.

Linear multiple regression was used to assess the effects of weather on recruitment of plains Sharp-tailed Grouse (*Tympanuchus phasianellus jamesi*) into the fall population on Valentine National Wildlife Refuge, in the Sandhills of Nebraska. The ratio of juveniles to adults harvested within a season was used as an index of recruitment into the fall population. Twenty years of recruitment data were obtained from the wings of grouse harvested on the refuge. Weather

data were obtained from weather stations located at the refuge headquarters and in the town of Valentine. Available weather data included minimum, maximum, and average daily temperatures, daily precipitation, and daily evaporation. These data were used to create ten variables, which I considered to have the greatest effect on Sharp-tailed Grouse recruitment. Biological considerations used to select appropriate weather variables included nest initiation, cover availability, brooding versus browsing time, insect abundance, heat stress, and drought. The final predictive model was selected using AIC model selection. The final model and my conclusions of this analysis will be presented at the Prairie Grouse Technical Council Meeting.

EFFECTS OF SHRUB CONTROL AND GRAZING ON LESSER PRAIRIE-CHICKEN REPRODUCTIVE SUCCESS IN NEW MEXICO: YEAR 0.

DAVID A. WIEDENFELD*, DON H. WOLFE, and STEVE K. SHERROD, Sutton Avian Research Center, Bartlesville, OK 74005 USA.

Although shin-high shinnery oak (*Quercus havardii*) is a native species, it is thought by some that the oak has become more widespread and dense in the past century, reducing grass cover, and that in turn could affect Lesser Prairie-Chickens detrimentally. Therefore, use of an herbicide, tebuthiuron, is being used to manage shinnery oak habitat for Lesser Prairie-Chickens. To assess the effects of oak control, we established 16 study plots of ¼ section each, 8 treated and 8 untreated. Tebuthiuron was applied in fall 2000. In spring 2001 the percentage of successful nests on treated areas was 40% and on untreated areas was 63%, but the difference was not significant. Comparison of vegetation between the two areas showed little difference; of 21 vegetation characteristics measured, only three were significant, showing generally more vegetation in the treated areas. Only one of 21 vegetation characteristics measured directly at the nests was significantly different. Vegetation at successful nests showed no significant

difference from unsuccessful nests. When away from the lek and nest, prairie-chickens used areas with less vegetation near ground and with more vegetation higher. In general, little difference could be detected between the treated and untreated areas in spring 2001. This is probably because this is the first year of the study, and the effects of the tebuthiuron treatment did not become apparent until late in the season.

NATAL DISPERSAL OF GREATER PRAIRIE-CHICKENS IN WISCONSIN.

DAVID A. HALFMANN*, Society of Tympanuchus Cupido Pinnatus, Ltd. (STCP), College of Natural Resources, University of Wisconsin-Stevens Point, Stevens Point, WI 54481 USA, JOHN E. TOEPFER, STCP, 3755 Jackson Ave., Plover, WI 54467 USA, MIKE W. BLONDIN, STCP, 4011 130th St. S., Wisconsin Rapids, WI 54494 USA.

Wisconsin Greater Prairie-Chicken (*Tympanuchus cupido pinnatus*) population decline and habitat fragmentation over the past 100+ years has resulted in metapopulation conditions. Currently, four core subpopulations exist primarily on four discrete state wildlife areas of variable size and management emphases. Recent intra- and inter-subpopulation movements are unstudied. As dispersal characterizes the linkage in metapopulations, natal dispersal was evaluated. Juveniles captured July-October, 1996-1998 were monitored to first breeding locations using radio-telemetry. Distance, direction, and timing were documented in regard to avian dispersal and subpopulation association hypotheses for 167 juveniles. Dispersal was not independent of sex (c^2=21.4, P<0.01); hen dispersal frequency (81%) was greater than cock (44%) overall and within each subpopulation. Furthermore, hens predominately made up the 14% of inter-subpopulation juvenile movements. Mean dispersal distance was greater for hens (6.9 km) than cocks (2.3 km) overall and differed by within 3 of 4 subpopulations. Uniform directional distributions occurred among all- areas and sex except within two subpopulations. Inter-subpopulation movement direction

was uniform but remained oriented toward adjacent subpopulations. Final dispersal occurred during February-March for cocks and March-early April for hens. Juvenile movement between central subpopulations was nearly absent eluding to two management needs; maintenance/enhancement of existing subpopulation relationships and habitat restoration in key places.

HOME RANGES AND MOVEMENTS OF RADIO-TAGGED GREATER PRAIRIE-CHICKENS IN AN HOMOGENEOUS, UNBOUNDED TALLGRASS PRAIRIE IN NORTHEASTERN OKLAHOMA.

DAVID A. WIEDENFELD*, DON H. WOLFE, and STEVE K. SHERROD, Sutton Avian Research Center, Bartlesville, OK 74005 USA.

Although Greater Prairie-Chickens (*Tympanuchus cupido*) often live in fragmented habitats, divided by cultivated fields, roads, or woodlands, it is useful to understand their range requirements in a homogenous, unbounded habitat. We measured the home ranges and movements of 45 radio-tagged Greater Prairie-Chickens in tallgrass prairie of northeastern Oklahoma. The habitat is homogenous grassland, with few roads or other structures and no cultivation. All birds were tracked and located at least 50 times. Tracking began on all birds in the spring of the year (March, April, and May) of 1997, 1998, or 1999, and continued for varying amounts of time until the bird was killed or lost. Home ranges were defined using a median-centered minimum convex polygon of 98% of the points.

Home range size averaged 6.61 sq. km. Home ranges of males (5.94 sq. km) averaged about two-thirds the size of those of females (8.64 sq. km), but the difference was not significant (Mann-Whitney U = 254, P = 0.15). The largest home range was of a hen (21.67 sq. km). Females are more likely to have moved from one activity center to another than males (χ^2= = 14.78, df = 1, P < 0.001). The maximum distance moved by individual birds was also significantly

larger in females (7.96 km) than males (3.90 km; U = 313, P = 0.003). The shape (rounded vs. linear) of home ranges as measured by the index (area / maximum dimension) was not significantly different between the sexes.
In this unbounded habitat the prairie-chickens generally remained within a few km of their first location, although some individuals, especially hens, did relocate their activity center after some time. Some long-range movements, however, may have gone undetected by our methods.

MOVEMENTS OF LESSER PRAIRIE-CHICKENS IN SOUTHWESTERN KANSAS.

B. E. JAMISON* and R. J. ROBEL, Kansas State University, Division of Biology, Manhattan, KS 66506 USA, and R. D. APPLEGATE, Kansas Department of Wildlife and Parks, Emporia, KS 66801 USA.

Mark-recapture and radio-telemetry were used to examine movements (emigration, daily movements, and inter-lek movements) and habitat selection of male Lesser Prairie-Chickens in fragmented sand sagebrush (*Artemisia filifolia*) habitats in southwestern Kansas from 1997-1999. During the three-year study, only two of 76 radio-marked males were known to have emigrated from the primary study area. Inter-lek movements were recorded for 21% of the 48 males that were recaptured and occurred more often than previously has been documented for lesser prairie-chickens. Male Lesser Prairie-Chickens exhibited strong selection for sand sagebrush habitats at two nested scales of habitat availability in nearly every month of the study. These results suggest that yearling and adult male Lesser Prairie-Chickens are poor dispersers, and that remaining occupied sand sagebrush habitat fragments should be protected and expanded.

VEGETATION AND INVERTEBRATE BIOMASS IN USE AND NON-USE AREAS OF LESSER PRAIRIE-CHICKEN BROODS IN SOUTHWESTERN KANSAS.

G. C. SALTER* and R. J. ROBEL, Division of Biology, Kansas State Univ., Manhattan, KS 66506-4901 USA.

Because chick survival is critical to productivity in Lesser Prairie-Chicken (LPCH) (*Tympanuchus pallidicinctus*) populations in sand sagebrush (*Artemisia filifolia*) rangelands of southwestern Kansas, we determined characteristics of LPCH brood habitat in two large fragments of sandsage prairie that contain stable LPCH populations. We determined brood habitat by tracking transmitter-equipped hens with broods and transmitter-equipped chicks during the summers of 2000 and 2001. Vegetation characteristics and invertebrate biomass (2001 only) were measured at flush sites in areas used by LPCH broods (use areas) and paired random sites in areas not used by LPCH broods (non-use areas). Vegetation measurements included visual obstruction readings, sagebrush density, and percent canopy cover of grass and forbs whereas invertebrate biomass was determined using sweep-net sampling. Fifteen brood use areas (45 flush sites) and non-use areas (45 random sites) were characterized in 2000 and 9 use (42 flush sites) and non-use (42 random sites) areas in 2001. Vegetation characteristics of sand sagebrush communities were different between brood use and non-use areas. Sweep net-collected samples of invertebrates had significantly greater mass from brood use areas than non-use areas. Concurrent research determined that sizes of LPCH brood home ranges and chick survival were associated with various brood habitat characteristics. These data will help wildlife biologists attempting to develop LPCH brood habitat in sand sagebrush rangelands and show the attractiveness of areas with higher invertebrate biomasses to LPCH broods.

INFECTIOUS DISEASE SURVEY OF LESSER PRAIRIE-CHICKENS IN NORTHEASTERN TEXAS.

MARKUS J. PETERSON*, Department of Wildlife and Fisheries Sciences, Texas A&M University, TAMU-2258, College Station, Texas 77843-2258, USA, PAMELA J. FERRO, Texas Veterinary Medical Diagnostic Laboratory System, P.O. Drawer 3040, College Station, Texas 77843-2258, USA, M. NILS PETERSON, Department of Wildlife and Fisheries Sciences, Texas A&M University, TAMU-2258, College Station, Texas 77843-2258, USA, ROBERT M. SULLIVAN, Texas Parks and Wildlife Department, P.O. Box 659, 5900 Cemetery Road, Canyon, Texas 79015, USA, BENJAMIN E. TOOLE, and NOVA J. SILVY, Department of Wildlife and Fisheries Sciences, Texas A&M University, TAMU-2258, College Station, Texas 77843-2258, USA.

Lesser Prairie-Chicken (*Tympanuchus pallidicinctus*) abundance, like that of most other grassland birds, has declined range-wide for decades. Although habitat loss and degradation are likely ultimate causes for this decline, infectious agents—particularly microparasites—could be proximate contributors. No surveys of pathogenic bacteria or viruses have been conducted for this species. We surveyed 24 free-living Lesser-Prairie Chickens from Hemphill County, Texas, for evidence of exposure to ten microparasitic agents known to cause disease in galliforms. Two of 18, and eight of 17 samples were found positive for the Massachusetts and Arkansas serotypes of infectious bronchitis virus, respectively. Five of the eight positive individuals were juveniles. All other serological and genetic tests were negative. Because Lesser Prairie-Chickens are closely related to other phasianids where pathogenic avian coronaviruses have been isolated, we suggest challenging captive-reared Lesser Prairie-Chickens with infectious bronchitis virus (an Arkansas isolate) to determine whether this species is susceptible, and to describe pathogenesis and transmission. If clinically ill Lesser Prairie-Chickens can be found in the wild, virus isolation and characterization should be attempted.

FOOD REQUIREMENTS OF HAND-REARED PRAIRIE-CHICKEN CHICKS.

MARC F. HESS and NOVA J. SILVY, Department of Wildlife and Fisheries Sciences, Texas A&M University, College Station, TX 77843-2258, USA.

This study was conducted to obtain estimates of daily food requirements of hand-reared prairie-chickens (*Tympanuchus* spp.). The necessity of raising Attwater's Prairie-Chicken (*T. cupido attwateri*) chicks to supplement wild populations requires such knowledge. Because prairie-chicken chicks consume large quantities of insects prior to switching to a herbaceous died, it is important to know the daily quantity of insects needed for healthy growth. Day old chicks were assigned numbered leg bands and their weight recorded. Chicks were placed in 0.5 m^2 wooden brood boxes placed on white terry cloth towels and covered with screens to prevent loss of insects. Ceramic heat lamps provided heat, but no light; brood boxes were placed in front of windows to take advantage of natural sunlight and to simulate natural day length. Chicks were provided water (*ad libitum)* and food in three different forms (supplied *ad libitum*, but weighed): chopped vegetable greens, dry exotic game bird chick starter, and commercial insects (mealworms and crickets). Chicks were weighed each morning to track daily weight gain. Vegetables, exotic game bird starter, and insects remaining from the previous day were collected and weighed. Weight of the individual food items not consumed by the chicks was subtracted from weight of the individual food items supplied to chicks during the previous day. This study was conducted for a two weeks, with three different groups of six chicks. Mean daily intake of vegetables per chick for the three replications was 5.3, 3.9, and 10.2 g, respectively. Mean daily intake of chick starter was 2.0, 1.7, and 5.2 g for each group, respectively. Mean daily intake of insects for each group 19.8, 18.5, and 23.0 g, respectively. Mean daily intake of

vegetables and chick starter differed significantly ($P < 0.001$) between groups; however, the intake of insects did not differ. There also was a significant difference ($P < 0.002$) in the mean daily percent food metabolized per chick (means of 3.1 %, 2.8 %, and 4.0 % for the groups, respectively). Insects appeared to be the most important component of the chick's early diet.

IMPROVEMENTS ON THE WALK-IN TRAP DESIGN FOR CAPTURING PRAIRIE GROUSE.

DONALD H. WOLFE, DAVID A. WIEDENFELD, and STEVE K. SHERROD, Sutton Avian Research Center, Bartlesville, OK 74005 USA, and JOHN E. TOEPFER; Society of Tympanuchus Cupido Pinnatus, Ltd., Plover, WI 54467 USA.

For decades, various designs of walk-in traps have been used for capturing prairie grouse for relocation and telemetry studies. The basic design is a series of circular wire traps, each containing one or more funnel openings, attached to drift fences arranged in a large "W" manner across a prairie grouse lek. In 1997, Sutton Avian Research Center began research on Greater Prairie-Chickens (*Tympanuchus cupido*) in Oklahoma, and has since applied the same capture techniques to Lesser Prairie-Chickens (*Tympanuchus pallidicinctus*) at study sites in Oklahoma and New Mexico. Over the course of the past four years, we have developed significant modifications. Our major concerns when developing and improving upon this design were safety for the captured animal, durability of traps and fences, capturing as many birds as possible, and minimizing risk to livestock that might be in the area. The modifications we have made not only improve the capture rate, but also lessen the chance of injury to captured birds. Other researchers and managers involved with study or relocation of sage-grouse and prairie-chickens may also find these modifications advantageous, and some of these modifications may applicable to other study species as well.

GREATER PRAIRIE-CHICKEN NEST SUCCESS IN RELATION TO BURN TREATMENT AND PROXIMITY TO BURN EDGE IN OKLAHOMA TALLGRASS PRAIRIE.

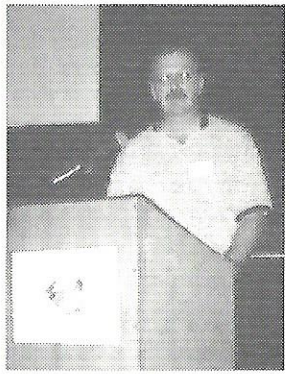
DONALD H. WOLFE, DAVID A. WIEDENFELD, and STEVE K. SHERROD, Sutton Avian Research Center, P.O. Box 2007, Bartlesville, OK 74005 USA.

From 1997 through 2000, 72 Greater Prairie-Chicken (*Tympanuchus cupido*) nests were found and monitored in the tallgrass prairie region of northeastern Oklahoma. Approximately 70% of the acreage is burned annually, mostly in March, greatly increasing the amount of palatable and nutritious forage available to stocking operations. These burned areas have greater abundance of insects, as well as lush, soft vegetation, and are assumed to be highly favorable for prairie-chicken brood rearing. However, since Greater Prairie-Chickens initiate first nesting attempts in late April or early May, lack of residual vegetation in burned areas may limit nest site availability. Over 80% of the nests were found in unburned areas, most within a few hundred meters from a burn edge. Nests close to the burn edge (less than 200 meters) had a significantly lower success rate than all other nests. The highest nest success rate occurred for nests between 200 meters and 500 meters from a burn edge. Other nest site characteristics considered are amount of forbs present, proximity of nest to woody vegetation, proximity of nest to water, etc.

Minutes of the Business Meeting

November 7, 2001
Woodward, Oklahoma

Minutes - Business Meeting



1. **Call to order:** 1:05 pm – Rick Baydack. Baydack explained that in Russ Horton's absence, chairing the business meeting fell to the previous Chair (23rd PGTC), hence Rick's chairing the meeting.

2. **Minutes of the 23rd PGTC meeting** were distributed with all registration packages. Revision noted from floor that "Item 13 - Archives" are housed in Columbia, Missouri. The exact mailing address is Western Historical Manuscript Collection, 23 Ellis Library, University of Missouri, Columbia, MO 65201-5149.

   Moved minutes be accepted with the revision (Silvy). Seconded (Hagen).

3. Call for **additional agenda items** (Baydack). These were presented and discussed as follows:

   (i) Introduction of Executive Committee PGTC (Baydack):
   Russ Horton (Oklahoma) – Chair 24th
   Rick Baydack (Manitoba) – Chair 23rd
   Nova Silvy (Texas) – Chair 22nd

   (ii) List Server (Wiedenfeld)
   David noted that those not currently accessing the PGTC List Server could contact him for access.

   (iii) Prairie Grouse Bibliography (Toepfer). (See Item 8, 1999 Minutes) Toepfer explained it is still under development and anticipates a 2002 completion; likely to be published by the Tympanuchus Cupido Society.

   (iv) General discussion re a potential Prairie Grouse website either via the Sutton Center or NAGP. No action item resulted.

   (v) Prairie Grouse book (see Item 1, 1999 Minutes); discussion deferred to next meeting (i.e. 25th PGTC).

   (vi) Archives Reminder (Applegate) of their current "home" and recommendation

that the address for this be provided on the PGTC List Server.

4. **Treasurer's Report:** Baydack prefaced the report by noting that the surplus from the Texas (22nd) meeting was forwarded directly to Oklahoma for the 24th meeting in order to spare the loss on exchange conversion to Canadian dollars for Manitoba for the 23rd. Baydack also noted that surplus dollars from the 23rd PGTC (Manitoba) meeting were disbursed as follows:

   (i) Stockpile of approximately 15 Hamerstrom Award plaques;

   (ii) Approximately $500 (Cdn) to Oklahoma;

   (iii) Balance held by a Canadian Crown Corporation (Manitoba Habitat Heritage Corporation) to be used specifically to fund a portion of student presenter costs to attend future PGTC meetings.

   24th PGTC Treasurer's Report (Harmon)

   Preliminary at this time, but revenue and other in-kind sources include registration, Woodward Chamber of Commerce, surplus from 22nd (Texas) and 23rd (Manitoba) meetings, Pheasants Forever.

Harmon anticipates a surplus following all expenses and with the banquet auction proceeds to exceed $2000.

5. **North Dakota Grouse Symposium** (Silvy): A proposal has been submitted to The Wildlife Society for a one-day symposium on grouse at the Bismarck TWS meeting in September 2002. Organizers should know by mid December whether this has been accepted and an update will be provided on the List Server. If so, abstracts will be required by February 15, 2002.

   Prairie Grouse Occasional Paper: Svedarsky noted this symposium may provide an opportunity to publish the papers as an "Occasional Paper," and also noted there are precedents.

6. **Committee Reports**

   (i) Guidelines for Interagency Prairie Grouse Translocation, as per the 23rd PGTC Minutes, are official as they were passed at the last meeting and no comments or revisions were received. (Taylor).

   Baydack/Taylor: Noted the potential for broader distribution of these (e.g. as a TWS Bulletin paper). Silvy suggested amalgamating the "Transfer" guidelines and the "Limiting

Transmission" guidelines (see below) as one paper.

(ii) Limiting Transmission of Diseases and Parasites of Prairie Grouse during Translocation. Wiedenfeld provided a short presentation summarizing the report to date (see attached) and noted it was a "Draft in progress" open for comment and review.

Discussion:

Q. Klataske	Asked about birds testing positive for disease, all from same locale.
	General discussion on need for a protocol in handling Prairie Grouse that considered transport device (cage), size, number of birds, cleanliness, etc.
Q. Sandercock	Timelines in Draft are currently very tight from sampling to potential transport. Are they realistic?
A. Wiedenfeld	Suggested capture, sample, release, test and recapture birds from a site

	once it is considered "clean."
Q. Rogers	Asked how long a turn-around time could be expected for test results.
A. Wiedenfeld	If prepared for analysis (e.g. lab informed, etc) it can be done "quickly," but scheduling may be an issue.

Comments:

Silvy	Timing may be an issue as some tests may require more than one day.
Toepfer	Likely a requirement that the vet in the receiving state will require standards met there regardless of what PGTC decides.
Taylor	The importance of establishing what/where the "clean" populations are well before a transfer occurs is critical.

Schroeder	Noted some states require pre-transport (i.e. capture locale) test results.
Wiedenfeld	Noted the importance of reliable testing.
Peterson	Noted that some states vets will require different testing vs. others, but PGTC is providing reasonable biological guidelines.
Applegate	Noted that for a transfer there may be a requirement to meet the regulations of all states that the birds pass through.
Harmon	Noted there are no guidelines for treatment of diseased birds in the above.

Discussion closed by Baydack noting that both reports (Taylor, Wiedenfeld) will be on the List Server for further comments, including suggestions to amalgamate them.

Motion (Silvy) that the documents to be posted on the PGTC List Server be accepted

in principle, and are open to comment and revision. **Seconded** (Stewart). **Carried** by vote.

Kobriger recommended that for these and future reports they could be endorsed between meetings by putting out a ballot to membership for adoption. Baydack suggested that Taylor and Wiedenfeld coordinate such a process.

7. **Determination of Host for Next PGTC Meeting**

Baydack presented an overview of states and provinces that have not hosted the PGTC for a number of years, and asked representatives from each if they wished to host the 25th meeting. Nebraska and Kansas noted they would consider it if there were no other bids. Washington agreed to consider the 26th. Wisconsin put forth a bid that would see the meeting in the NW part of the state with potential to view and see habitat management for Sharp-tailed Grouse.

Baydack called for a vote and Wisconsin was chosen to host the 25th PGTC meeting in 2003. Jim Keir will serve as the contact. Location to be announced.

8. **North American Grouse Partnership** (Steve Sherrod)

Sherrod provided a comprehensive overview of NAGP including a promotional video. He introduced Rob Manes to report on actions with Government (summary to be provided on List Server by Manes). A few questions/comments from Manes's presentation followed. Klataske suggested a promotion of a grassland resource program and consideration of Prairie Grouse as keystone species. The need for NAGP to work with states' technical committees was noted (Morrow) to insure a coordinated approach.

Sherrod outlined the NAGP's mission statement and accomplishments:

(i) Partnerships – State, NGO.

(ii) Government Policy – see above.

(iii) Public Information – Newsletters, website under development, National Geographic article in the works.

(iv) Research & Management – Symposia support via state chapters.

(v) Landowner Incentives – Under development.

(vi) Land Acquisition – Grant preparation underway. Partnerships critical.

Baydack reminded the attendees that PGTC are the technical authority for NAGP as per minutes of the 23rd PGTC meeting.

Questions and Comments:

Svedarsky	Commented that a shortened mission statement be considered, and that the mission statement appears regulatory.
Sherrod	Noted there is a shorter version, and acknowledged these needed revisiting.
Svedarsky	Suggested adding in "and provinces" to include Canada in mission statement.
Q. Sandercock	Is NAGP active only in US at present?
A. Sherrod	Replied it is presently active in US states only. Under discussion with DU Canada re potential

donors, etc. and tax receipting in Canada).

Q. Svedarsky	What are links to other grouse groups?
A. Sherrod	NAGP wants to insure complete cooperation with them.
Manes	Noted that until NAGP there was no one group to profile grouse and bring together many diverse and influential groups.

Sherrod asked Rob Manes to describe further possibilities for NAGP.

Manes	Range-wide planning for grouse management that coordinates state/federal planning is important. NAGP could play a role here. There are potential federal dollars to do this (eg. Wildlife Conservation Program Grants). Suggested a multi-state approach would work and challenged the group to consider this.

9. **New Business**

Harmon	Given that there may be a balance of $2000+ from the 24th PGTC meeting, what are the options?
Baydack	Reiterated what Manitoba had done (see above).
Harmon	Suggested potential to support the Prairie Grouse Bibliography or Book (see above), or endowment for future works.
Baydack	Asked about previous surpluses.
Kobriger	Noted until recently mostly broke even or had a small surplus that went to next meeting.
Baydack	Suggested there may be a need to establish a strategy for future surpluses. Baydack and Harmon will work toward the development of a draft strategy on this subject.

Meeting adjourned at 3:10 pm. Moved by Stewart, seconded by Wiedenfeld.

Respectfully submitted by Don A. Sexton

Hamerstrom Award

The Hamerstrom Award was established in honor of Fred and Fran Hamerstrom, pioneers of prairie grouse research and management.

- The award is to recognize individual(s) and organization(s) who have made significant contributions in prairie grouse research, management or other support programs which have enhanced the welfare of one or more species of prairie grouse in a particular state or region.
- The contribution should be evidenced by a sustained effort over at least 10 years.
- The contribution may be related to research, management activity, promotion of an integrated program, or some combination thereof.

Its first recipient was Fran Hamerstrom, in 1991, and it has been since awarded at the biennial meetings of the Prairie Grouse Technical Council.

When the awards program was in the concept stage, Fran wanted to ensure that the Hamerstrom name not be associated with any interpretation of the word "conservation" that would include any relationship to the anti-hunting mentality. To make that clear, the awards presentation is to include the following recommendation from Fran's *Wild Foods Cookbook* on yet another way to enjoy prairie grouse.

Prairie Grouse

Adapted from:
Hamerstrom, Frances. 1989. *Wild Foods Cookbook.* Iowa State University Press, Ames, Iowa.

Prairie grouse are outstanding table birds. Unlike most gallinaceous birds such as pheasant and Ruffed Grouse, they retain their juices well and do not tend to dry out while cooking.

Very young birds, still in juvenal plumage, have light breast meat of delicate texture but the flavor is still undeveloped. By October, almost all the birds are in prime condition, with breast meat dark, almost like the legs, and very delicious.

Chickens and sharptails should be served rare or at most well-done.

Roast:
Pluck dry, dress and clean. Do not stuff. Roast in a hot oven (450 degrees) 25 minutes for medium-rare sharptails or chickens.

Fried Prairie Grouse:
Pluck, dress, and clean. Cut in pieces for frying. The breasts of these birds are so plump that it is often simpler to cut them away from the bone: then cut or divide each side of the breast into two pieces. If this is not done, the legs and back will be overdone while the breast still requires more cooking. Flour each piece lightly before placing it in the hot fat. Salt just before serving.

If you want to take the wild taste out of your grouse, pay no attention to anything I've written.

2001 Recipient of the Hamerstrom Award

Presented to Leonard L. McDaniel
at the
24th Prairie Grouse Technical Council Meeting
Woodward, Oklahoma
7 November 2001

This year's recipient graduated with a degree in wildlife biology from Montana State University and worked for a time with Animal Damage Control for the U.S. Fish and Wildlife Service. In 1977, he started work as the assistant refuge manager in charge of the Valentine National Wildlife Refuge. In 1989, he became the wildlife biologist for the same refuge. Leonard (Len) McDaniel has been involved with prairie grouse conservation, management, and research throughout his 24 years with the 72,000-acre Valentine National Wildlife Refuge.

Nova Silvy (right) presents Hamerstrom Award to Len McDaniel.

First as a manager and later as a biologist, Len worked to manage the grasslands of the Refuge for the benefit of prairie chickens and sharp-tailed grouse. He argued hard for and was successful in assuring that grazing and haying on the refuge were managed for the conservation of wildlife rather than for beef production. He guided a reduction of both haying and grazing that resulted in increases in grouse, especially prairie grasslands and grouse populations. He documented increases in grouse with long-term data sets using both lek counts and harvest surveys.

These data sets proved valuable in defending grazing and haying cutbacks from critics of these reductions. He assured that grouse were given top consideration in planning and implementation of grassland management on the refuge. The long-term efforts have benefited grouse populations of the refuge and served as an example to others of how cattle grazing can be used as a tool for grassland management for the benefit of grouse populations.

Len McDaniel has worked cooperatively with the Nebraska Game and Parks Commission in both monitoring and management of prairie grouse. He has conducted lek counts of the state block sample area that includes the refuge for over 20 years. He has monitored hunter harvest using wing collection boxes in conjunction with the state. Len's guidance and these long-term data sets have been used by the Nebraska Game and Parks Commission in setting goals for juvenile/adult ratios; comparing production with areas of the state; in developing guidelines for grassland management for grouse; and as a benchmark for potential production of grouse in the Sandhills area of Nebraska. Valentine National Wildlife Refuge is held up as an example of how proper grassland management can benefit grouse production and populations.

Len has both worked with and advised the U.S. Forest service on grassland management techniques that benefit grouse populations. The U.S. Forest Services manages large prairies in both Nebraska and South Dakota that are significant for prairie-chicken and Sharp-tailed Grouse conservation. Grassland monitoring techniques have been shared and standardized between the Forest Service and Valentine National Wildlife Refuge. Long-term production has been compared between the Forest Service and the Refuge and the Forest Service has made the grouse a key indicator species for ecosystem health. Recent Forest Management Plans have been influenced by the work Len has done on the Refuge and with the Forest Service. Residual cover is now a key component in grassland planning, partly as a result of Len's efforts.

Over the years, Len has facilitated grouse research that has taken place on Valentine National Wildlife Refuge. Len has worked alongside both graduate students and university professors studying grouse behavior, genetics, food habits, and habitat requirements. His intimate knowledge of grouse and the habitats of Valentine National Wildlife Refuge has furthered the scientific knowledge of both prairie chickens and sharp-tailed grouse. He also has advised both researchers and managers doing research or considering management actions in other parts of the country. Len has passed both his knowledge of and keen interest in grouse on to many people he has come into contact with over the years. Len has been a regular at the Prairie Grouse Technical Council where he has both offered advice on management and brought home ideas that have benefited grouse conservation.

Please welcome are newest Hamerstrom award winner – Leonard L. McDaniel.

(Thanks to Mr. Mark Lindvall for his nomination of Len McDaniel and his great nomination letter, that made my job so easy.—Nova Silvy)

Previous Recipients of the Hamerstrom Award

1991	Fran Hamerstrom
1993	Ron Westemeier
1995	Dan Svedarsky and Jerry Kobriger
1998	Bob Robel
1999	Bill Berg

List of Registrants

There were 104 attendees from 19 US states, one Canadian province, and Scotland.

ANDERSON, Tim, P.O. Box 519, Eagle Lake, TX 77434, USA, tim_anderson@fws.gov

APPLEGATE, Roger, Kansas Wildlife & Parks, P.O. Box 1525, Emporia, KS 66801-1525, USA, rogera@wp.state.ks.us

BAIN, Matthew R., Dept. of Biology, Fort Hays State University, 600 Park St., Hays, KS 67601, USA, mrbain@scatcat.fhsu.edu

BAYDACK, Rick, Nat. Resource Institute, University of Manitoba, Winnipeg, MB R3T 2N2, CANADA, baydack@ms.umanitoba.ca

BELL, Luke, 3301 N. 1st, Apt. 6A, Durant, OK 74701, USA

BERG, Colin, Oklahoma Dept. Wildlife Conservation, 1801 N. Lincoln, Oklahoma City, OK 73105, USA, colin@onenet.net

BIDWELL, Terrence G., Department of Plant and Soil Sciences, 368 Ag Hall, Oklahoma State University, Stillwater, OK 74078, USA, bidwell@okstate.edu

BLONDIN, Mike, Sutton Avian Research Center, PO Box 2007, Bartlesville, OK 74005, USA

BLUDAU, Colin E. 1702 N Moody #C-3, Victoria, TX 77901, USA, cbludau@juno.com

BRAUN, Clait, Grouse Inc., 5572 Ventana Vista Road, Tucson, AZ 85750-7204, USA, sg-wtp@juno.com

BUTCHER, Greg, 21375 Ann Rita Drive, Brookfield, WI 53045, USA, gregbutcherwi@hotmail.com

COOPER, Kathy, 1019 NE 800, Missouri Department of Conservation, Windsor, MO 65360, USA, coopek@mail.conservation.state.mo.us

CORACE III, R. Gregory, School of Forestry and Wood Products, Michigan Technological University, Houghton, MI 49931, USA, rgcorace@mtu.edu

CRAWFORD, Brandon, East Texas Program Manager, The Nature Conservancy, 4702 Hwy. 146 North, Texas City, TX 77590, USA, bcrawford@tnc.org

CROUCH, Barth, Pheasants Forever, 205 S. Santa Fe, Salina, KS 67401, USA

DEMASO, Stephen J., Wildlife Division, Texas Parks and Wildlife Department, 4200 Smith School Road, Austin, TX 78744, USA, steve.demaso@tpwd.state.tx.us

DEWALD, Sherry, 2000-18th St., Woodward, OK 73801, USA

DIXON, Charles, Wildlife Plus, P. O. Box 416, Alto, NM 88312, USA, wildlifeplus@zianet.com

EVRARD, Jim, 630 N Pine Street, Grantsburg, WI 54840, USA, evrardsc@grantsburgtelcom.net

FIELDS, Tamara, 411 S. Whitcomb St., Fort Collins, CO 80521, USA, fields_tamara@hotmail.com

FLANDERS, Bridgette, Department of Fishery and Wildlife Biology, Colorado State University, , Fort Collins, CO 80523-1474, USA, bridgette_flanders@hotmail.com

FLOCK, Brian, P. O. Box 1525, 1830 Merchant St., Kansas Department Wildlife and Parks, Emporia, KS 66801, USA, flockbri@emporia.edu

FREE, Wade, Rte. 1 Box 126, Sharon, OK 73855, USA

FROESE, James, 144 Le Maire St., Winnipeg, MB R3V 1C9, CANADA, rj_froese@umanitoba.ca

FUHLENDORF, Sam, Department of Plant and Soil Sciences, 368 Agricultural Hall, Oklahoma State University, Stillwater, OK 74078-6028, USA, fuhlend@okstate.edu

GANGULI, Amy, Department of Plant and Soil Sciences, 368 Ag Hall, Oklahoma State University, Stillwater, OK 74078, USA

GILLEN, Bob, USDA-Agricultural Research Station, 2000 - 18th St., Woodward, OK 73801, USA, bgillen@spa.ars.usda.gov

GILMORE, Len, Missouri Department of Conservation, 4044 NE 90th Rd., Osceola, MO 64776, USA, gilmol@mail.conservation.state.mo.us

GROSSMAN, Steve, 44357 Red Oak Rd., Staples, MN 56479, USA

HAGEN, Christian A., Division of Biology, Kansas State University, Manhattan, KS 66506-4901, USA, cah3939@ksu.edu

HALFMANN, David, College of Natural Resources, UW - Stevens Point, Stevens Point, WI 54481, USA, davidhalfmann@hotmail.com

HARMON, Stephanie, Ecological Services, US Fish and Wildlife Service, 222 South Houston Suite A, Tulsa, OK 74127-8909, USA, stephanie_harmon@fws.gov

HECK, Willard, Weaver Ranch, P. O. Box 23, Causey, NM 88113, USA, wrcnm@yucca.net

HENDRIX, John, Rte 1 Box 138, Coyle, OK 73027, USA, jhendrix@onenet.net

HESS, Marc, Department of Wildlife and Fisheries Sciences, Texas A&M University, College Station, TX 77843-2258, USA

HOAR, Dick, Oklahoma Department Wildlife Conservation, 1801 N. Lincoln, Oklahoma City, OK 73105, USA

HUDSON, Peter J., Department of Biological Sciences, University of Stirling, Stirling, Scotland FK9 4LA, UK, p.j.hudson@stir.ac.uk

HUGHES, John P. , U.S. Fish and Wildlife Service, P.O. Box 713, Canadian, TX 79014, USA, john_p_hughes@fws.gov

JAMISON, Brent, U.S. Geological Survey, Northern Prairie Wildlife Research Center, 8711 37th St SE, Jamestown, ND 58401-7317, USA, brent_jamison@usgs.gov

JOHNSON, Jeff, Department of Biological Science, University of Wisconsin - Milwaukee, Milwaukee, WI 53201, USA, jefferyj@uwm.edu

JONES, Robert E., Box 96, Portage La Prairie, MB R1N 3B2, CANADA, bjonesph@mb.sympatico.ca

JONES, Ryan, Department of Wildlife and Fisheries Sciences, TAMU-2258, Texas A&M University, College Station, TX 77843-2258, USA

KEIR, Jim, Wisconsin Dept. of Natural Resources, Ranger Station, Box 100, Friendship, WI 53934, USA, keirj@dnr.state.wi.us

KLATASKE, Ron, Audubon of Kansas, 813 Juniper Dr., Manhattan, KS 66502, USA, rklataske@hotmail.com

KOBRIGER, Jerry, North Dakota Game and Fish, 225 30th AVE SW, Dickinson, ND 58601, USA, gkobrige@state.nd.us

KOOIKER, Paul, Wisconsin DNR, Box 367, Grantsburg, WI 54840, USA, kooikp@dnr.state.wi.us

KRAMOS, Greg, U.S. Fish & Wildlife Service, 315 Houston Suite E, Manhattan, KS 66502, USA, greg_kramos@fws.gov

LEIF, Tony, 2211 Hawaii Ave. SW, Huron, SD 57350, USA

LONCARICK, Frank, Arkansas Coop. Fish & Wildlife Res. Unit, Biological Sciences--WAAX 203, University of Arkansas, Fayetteville, AR 72701, USA

LUCAS, Tom, High Plains Resource Conservation and Development Council, Box 353, Buffalo, OK 73834, USA

MANES, Rob, Midwest Regional Representative, Wildlife Management Institute, 10201 S. Hwy. 281, Pratt, KS 67124, USA, wmimanes@prattusa.com

MCALISTER, Mike, 617 W. 4th, Sand Springs, OK 74063, USA

MCDANIEL, Leonard L., 625 Government, Valentine, NE 69201, USA, lenslek@yahoo.com

MCDANIEL, Patricia, Phalarope Consulting, 1 Pueblo Pointe, Clovis, NM 88101, USA, phalaropecon@yahoo.com

MCKNIGHT, Celeste, 3555 H St., Eureka, CA 95503, USA, cmmcknigh@hotmail.com

MECHLIN, Larry, Missouri Dept. Conservation, 1110 College Avenue, Columbia, MO 65201, USA, mechll@mail.conservation.state.mo.us

MEHLHOP, Pat, US Fish and Wildlife Service, P. O. Box 25486, Denver, CO 80225, USA, pat_mehlhop@fws.gov

MORROW, Mike, Atwater Prairie Chicken NWR, P.O. Box 519, Eagle Lake, TX 77434, USA, mike_morrow@fws.gov

ODLE, Brad, Kansas Department of Wildlife and Parks, 618 NE Bluestem Road, Eldorado, KS 67042-8643, USA

PAINTER, Nancy, P. O. Box 1778, Carlsbad, NM 88221, USA

PEOPLES, Alan, Oklahoma Department Wildlife Conservation, 1801 N. Lincoln, Oklahoma City, OK 73105, USA, apeoples@odwc.state.ok.us

PETERSON, Markus, Department Wildlife and Fisheries Science, 2258 TAMU, Texas A&M University, College Station, TX 77843, USA, mpeterson@tamu.edu

PITMAN, Jim, Division of Biology, 232 Ackert Hall, Kansas State University, Manhattan, KS 66506-4901, USA, jpitman98@hotmail.com

RANDALL, JR., Randolph E., Natural Resources Consultant, Western Governors' Association, 1515 Cleveland Place Suite 200, Denver, CO 80202, USA, rrandall@westgov.org

REINKING, Dan, Sutton Avian Research Center, PO Box 2007, Bartlesville, OK 74005, USA, dreinking@ou.edu

REMPE, John, Oklahoma Department Wildlife Conservation, 1801 N. Lincoln, Oklahoma City, OK 73105, USA

RILEY, David, Sutton Avian Research Center, PO Box 2007, Bartlesville, OK 74005, USA

ROBB, Leslie, P. O. Box 1077, Bridgeport, WA 98814, USA

ROBEL, Robert, Kansas State University, Division of Biology, Manhattan, KS 66506-4901, USA, rjrobel@ksu.edu

RODGERS, Randy, Dept. Wildlife & Parks, P.O. Box 338, Hayes, KS 67601, USA, randyr@wp.state.ks.us

ROSSIGNOL, Terry, Attwater NWR, P.O. Box 519, Eagle Lake, TX 77434, USA

SAKODA, Fumiko, Sutton Avian Research Center, PO Box 2007, Bartlesville, OK 74005, USA

SALTER, Curran, 2304 Menke St., Garden City, KS 68746, USA, gsalter@pld.com

SAMS, Mike, Oklahoma Department Wildlife Conservation, 1801 N. Lincoln, Oklahoma City, OK 73105, USA, mgsams@hotmail.com

SANDERCOCK, Brett K., Division of Biology, Ackert Hall, Kansas State University, Manhattan, KS 66506, USA, bsanderc@ksu.edu

SCHENKE, L. Diane, East Texas Program Manager, The Nature Conservancy, 4702 Hwy. 146 North, Texas City, TX 77590, USA, dschenke@tnc.org

SCHROEDER, Michael, Wash. Department of Wildlife, P.O. Box 1077, Bridgeport, WA 98813-1077, USA, grouse@televar.com

SEPTON, Greg, Milwaukee Public Museum, Milwaukee, WI 53233, USA

SEXTON, Don, 964 Crestview Park Dr., Winnipeg, MB R2Y 0V8, CANADA, d_sexton@ducks.ca

SHACKFORD, John, Coop. Wildl. Res. Unit, Oklahoma State University, Stillwater, OK 74078, USA, johnsshack@aol.com

SHERMAN, John, Bureau of Land Management, Carlsbad Field Office, 620 Greene St., Carlsbad, NM 88221, USA, jsherman@nm.blm.gov

SHERROD, Steve K., Sutton Avian Research Center, PO Box 2007, Bartlesville, OK 74005, USA, blackjess1@aol.com

SILVY, Nova, Department of Wildlife & Fisheries Sciences, 210 Nagle Hall, Texas A&M University, College Station, TX 77843, USA, nsilvy@wfscgate.tamu.edu

SIMCOX, Brad, Natural Resource Conservation Service, 111 N Cedar, Suite 3, Shelbyville, IL 62565, USA

SIMPSON, Scott, Illinois Department of Natural Resources, Prairie Ridge State Natural Area, 4295 N 1000th St., Newton, IL 62448, USA, ssimpson@dnrmail.state.il.us

SPAULDING, Allen, 5305 Old Main Hall, Department of Biology, Utah State University, Logan, UT 84322-5305, USA, aspauldo@biology.usu.edu

STEWART, Al, Upland Game Bird Specialist, Michigan Department of Natural Resources, PO Box 30444, Lansing, MI 48809, USA, stewarac@state.mi.us

SULLIVAN, Robert M., Texas Parks and Wildlife Department, P. O. Box 659, Canyon, TX 79015, USA, robert.sullivan@amaonline.com

SVEDARSKY, Dan, University of Minnesota, Crookston, MN 56716, USA, dsvedars@mail.crk.umn.edu

SVINGEN, Dan, Dakota Prairie Grasslands, USDA Forest Service, 240 W. Century Ave., Bismarck, ND 58503, USA, svingen@btigate.com

TAYLOR, Scott, Nebraska Game and Parks Commission, 2200 N. 33rd Street, Lincoln, NE 68503, USA, staylor@ngpc.state.ne.us

TOEPFER, John, 3755 Jackson Ave., Plover, WI 54467, USA, jtoepfer@coredcs.com

TOOLE, Benjamin, Department of Wildlife and Fisheries Sciences, Texas A&M University, , College Station, TX 77843-2258, USA, betoole95@yahoo.com

TUSH, Rick, KS Dept. Wildlife & Parks, 1519 Quincy, Eureka, KS 67045, USA, rickt@wp.state.ks.us

VAN DEN BUSSCHE, Ronald A., Department of Zoology, 430 LSW, Oklahoma State University, Stillwater, OK 74078, USA, ravdb@okstate.edu

VODEHNAL, William L., Wildlife Division, Nebraska Game and Parks Commission, P.O. Box 508, Bassett, NE 68714-0508, USA, vodehnal@ngpc.state.ne.us

WARHEIT, Kenneth I., 17225 Kent St. SE, Tenino, WA 98589, USA, warhekiw@dfw.wa.gov

WATSON, Danny, Oklahoma Department Wildlife Conservation, 1801 N. Lincoln, Oklahoma City, OK 73105, USA, beaverwm@ptsi.net

WHITE, Ed, Iowa Department of Natural Resources, RR#1, Box 180, Mt. Ayr, IA 50854, USA,

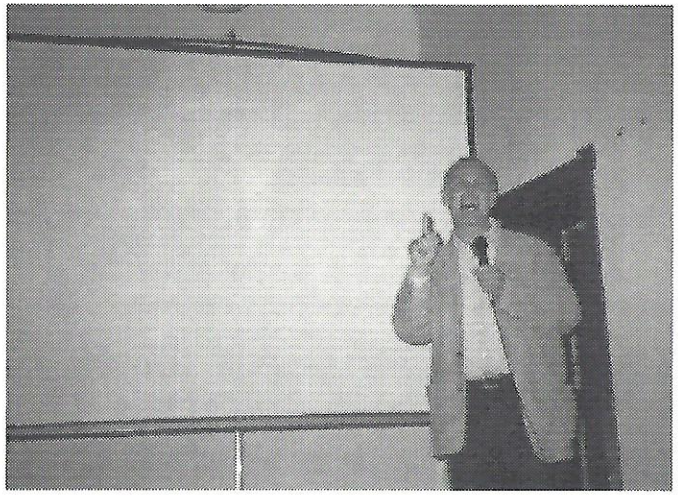
WIEDENFELD, David A., Sutton Avian Research Center, PO Box 2007, Bartlesville, OK 74005, USA, dwiedenfeld@ou.edu

WILLSEY, Ben, 605 Foch St. Apt. A, Bryan, TX 77801, USA

WILSON, Eddie, P. O. Box 1622, Woodward, OK 73802, USA, cooperwma@pldi.net

WOLBRINK, Greg, 901 Utah SE, Huron, SD 57350-3344, USA

WOLFE, Don, Sutton Avian Research Center, P.O. Box 2007, Bartlesville, OK 74005, USA, dwolfe@ou.edu



Dr. Peter J. Hudson, banquet speaker, illustrating a point about Red Grouse biology and management.

Past Conferences

1st	Grand Island, Nebraska	September 1957
2nd	Emporia, Kansas	March 1959
3rd	Stevens Point, Wisconsin	September 1960
4th	Pierre, South Dakota	September 1961
5th	Nevada, Missouri	September 1963
6th	Warroad, Minnesota	September 1965
7th	Effingham, Illinois	September 1967
8th	Woodward, Oklahoma	September 1969
9th	Dickinson, North Dakota	September 1971
10th	Lamar, Colorado	September 1973
11th	Victoria, Texas	September 1975
12th	Pierre, South Dakota	September 1977
13th	Wisconsin Rapids, Wisconsin	September 1979
14th	Halsey, Nebraska	September 1981
15th	Emporia, Kansas	September 1983
16th	Sedalia, Missouri	September 1985
17th	Crookston, Minnesota	September 1987
18th	Escanaba, Michigan	September 1989
19th	Billings, Montana	September 1991
20th	Fort Collins, Colorado	July 1993
21st	Medora, North Dakota	August 1995
22nd	College Station, Texas	February 1998
23rd	Gimli, Manitoba	September 1999
24th	Woodward, Oklahoma	November 2001

Executive Board

Russ Horton (Oklahoma)
Chair, 24th PGTC Meeting

Richard Baydack (Manitoba)
Chair, 23rd PGTC Meeting

Nova Silvy (Texas)
Chair, 22nd PGTC Meeting

Dan O'Hair discussing Lesser Prairie-Chicken habits and use of his ranch southwest of Laverne, Oklahoma, during Field Trip.