SOCIETY OF
TYMPANUCHUS
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LTD.

NEBRASKA SANDHILLS PROGRESS REPORT
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The information in this Progress Report is preliminary and ongoing. As such observations and data are incomplete and can and will change. Thus it should not be cited or quoted until a final report is produced.

This report summarizes my work for the Society of Tympanuchus Cupido Pinnatus, Ltd.(STCP) in 2014. At least four individuals were involved in trapping and collecting information on greater prairie-chickens (*Tympanuchus cupido pinnatus*) (GPC) in 2014 in Nebraska, and northwestern Minnesota. The information presented in this report was made possible by: STCP, Cabela's Outdoor Fund and the author.

The Nebraska study area is located in Rock County in the Sandhills south of Bassett. The study area has expanded since 2012 due to dispersal of radioed birds and now encompasses an area of about 1,100 square miles. The upland habitat in this region is dominated by native grasses and forbs. Cattle grazing is the main economic activity in the study area and the Sandhills. The STCP study area in northwestern Minnesota is located east of Ada in an agricultural landscape with a checker boarding of grassland areas and small woodland patches. The grasslands are a mix of native and exotic cool season grasses. The main crops are corn, wheat, beans and beets.

Prairie-chickens were captured on booming grounds using walk-in funnel traps just before and during the breeding peak in April 2014. Birds captured were processed and radio-marked. Each captured prairie-chicken was banded weighed, measured, had feathers collected and a portion of birds had 3 cc of blood taken from the jugular vein and spun for serum. Radio-marked hens with broods were circled at night to capture chicks at 6 weeks of age and they were radioed with 4-6 gram transmitter packages.

Because of the hilly terrain and mobility of radioed GPC, our current tracking strategy has evolved (out of necessity) to the point where we have concentrated on finding nests and following broods to study habitat and insects. In addition we monitor radioed birds periodically to aerial searches to locate missing birds and document dispersal movements and seasonal migrations.

Nests of radio-marked hens were visited only once and marked during mid-day to 19:00 hours. Each nest location was recorded via GPS. The presence of chicks with a radioed hen was determined at 2 weeks post hatch. The habitats used by broods, non-brood hens and radioed cocks during summer were surveyed on a

regular basis for the presence of insects by circling them and sweeping their habitats for “insects” with insect nets. In addition we photographed the areas to eventually determine height and habitat type(s) grass, forbs, shrubs or sedges. We also established control sites in Nebraska and in northwestern Minnesota that were surveyed on a regular basis for insects using sweep nets.

A total of 197 prairie grouse, 190 prairie-chickens, (54 cocks, 71 hens), 1 hen on her nest, 3 sharp-tailed grouse cocks and 3 prairie-chicken X sharp-tailed grouse hybrids and 65 young of the year were captured in 2014 in, Nebraska. The total includes 33 birds recaptured to replace radios. A total of 104 prairie grouse were captured and radio-marked in northwestern Minnesota in 2014. This total includes 102 prairie chickens (14 cocks, 52 hens, 36 young of the year) a hen sharptail and a prairie chicken X sharptail hybrid hen. Overall, two hens (0.7%) both young of the year in Minnesota died as a result of our trapping activities. All hens and young of year (chicks) were radio-marked. No birds died as a result of trapping activities in Nebraska

A grant STCP received from Cabela’s Outdoor Fund this year allowed us to purchase GPS modules. Seven of 12 GPS modules were provided by Telemetry Solutions in mid-October. The package consists of the GPS module (16 grams) with a short antenna and a small VHS standard radio transmitter (7-8 grams) with a short whip antenna super glued and sown onto a herculite poncho bib. The radio transmitter from Advanced Telemetry Solutions (ATS) is necessary to locate the bird to recover the module to download the stored locations which are collected at midnight every other day (48 hours). The total package weighed 23-24 grams which represents 2.4-2.8% of the captured bird’s body weight. The transmitter runs for 10 hours every day from 3AM to 1PM. This time period was chosen as a compromise so we would have enough darkness to allow time to night light the birds to retrieve the GPS module and allow enough daylight so the pilots could search for the missing birds.

Counts of cocks on the 22 booming grounds adjacent to and trapped on in Nebraska declined 23.1%, (251 to 193 or 58 cocks) from 2012 to 2014. The number of cocks in Minnesota based on MNDNR grid counts were slightly down from 2013 (1,415 cocks) and in 2014 (1,245 cocks) a decline of 170 cocks or 12%.

The 2014 breeding peak in Nebraska occurred on 10 April and on 18 April in northwestern Minnesota. In 2013 the peak occurred on 30 April in Nebraska and 1 May in northwestern Minnesota. In 2012 the breeding peak occurred on 3 April in Nebraska and 7 April in Minnesota. The variation in dates is due to weather conditions especially temperature. The 2014 breeding peak chronology in both Nebraska and Minnesota were normal in 2012 and 2014 and 2013 was an exceptionally late year.

A total of 60 nests were located in Nebraska and 51 in Minnesota in 2014. Nest success (at least one egg hatched) in Nebraska was 45.0% (27/60). Nest success was about 10% higher in northwestern Minnesota than Nebraska at 54.9% (28/51) in 2014. These are slightly higher than last year, 35.4% and 54.5% respectively. Fifty-eight (96.8%) of the 60 nests located in Nebraska in 2014 were found in sandhill pastureland and only two were located in hay meadows. This is comparable to 2012 and 2013 where over 90% were located in sandhill pastureland. Of the 51 nests located in 2014 in Minnesota, 25 (49.0%) were found in CRP grasslands. In 2014 and 2013, 46% of 44 nests, and 59.1% of 22 nests respectively were located in CRP grasslands.

Of the radio-marked hens in Nebraska in 2014 that had successful nests, 51.9% (14/27) fledged chicks and the average number of chicks fledged was 4.2/hen (n=23, Range 1-12). In Minnesota only 28.6% (8/28) of the radio-marked hens had successful nests fledged at least one chick. The average number of chicks fledged in Minnesota was half that of Nebraska or 2.1/hen (n=10, range 1-5). After three breeding seasons 2012-2014 overall nest success has been 18.0% higher in Minnesota than Nebraska, but the overall percent of hens that fledge chicks has been higher in Nebraska and so has the number of chicks fledged/hen. The overall production for 100 nesting hens in Nebraska was about 38% higher than Minnesota and twice that seen in Wisconsin. These results emphasize that nesting success in not the only factor that drives production but that the percent of hens that fledge chicks and the number of chicks fledged per hen are just as important.

The difference between the numbers of chicks fledged today and pre-1985 should be cause for concern. Warner et al (1999) reported that chick survival based on average brood sizes in pheasants has declined 3.5 chicks/hen from the early 1950's to the early 1990's from 7.7 to 4.2. This decline for pheasants was thought to be due to changes in agricultural practices. The reason(s) for the declines in brood sizes in GPC are not known at this time but raise serious concerns that some factor(s) is affecting the survival of young chicks. This becomes even more important now that we know that hens in a more natural grassland habitat in the Nebraska sandhills are more productive on the average than hens in Minnesota and Wisconsin.

Of the 89 radioed greater prairie-chickens known to be alive in Nebraska as of 1 November 2013 a total of at least 64 (71.9%) survived to 15 April 2014. Survival was highest for adult cocks, (81.2%, n=16) followed by adult hens (80.0%, n=30), then young of the year cocks (73.9%, n=23) and last young of the year hens (50.0%, n=20).

Despite the cold and snowy winter of 2013-2014 in northwestern Minnesota prairie-chicken survival was also very good. Of the 50 radioed greater prairie-chickens known to be alive in Minnesota as of 1 November 2013, at least 35 survived (70.0%) to 15 April, 2014. Survival was highest for adult cocks, (78.6,

n=14) followed by young of the year cocks (77.8%, n=9) then adult hens (72.7%, n=10) and last young of the year hens (52.9%, n=17).

Overall winter survival of greater prairie chickens in Nebraska and Minnesota was comparable at 71.9% (n=89) and 70.0% (n=50) with adult survival of both cocks and hens being higher than young of the year. One should not be surprised by the high survival of birds in northwestern Minnesota. Even though it was a long cold winter with lots of snow survival was good and likely helped by over 1,700 acres of standing corn left in the field in Norman and Clay counties. This was due to the high cost of drying and as a result many farmers left large acreages (quarter and half sections) of standing corn in the field overwinter for harvest in the spring. Snow blowing and drifting into the corn fields in December allowed the chickens to reach the today's taller ears so for most of the winter chickens and other wildlife had plenty food.

In addition to abundant food, snow conditions in 2013-2014 in Minnesota were ideal - that is deep enough and soft enough so chickens could snow burrow at night from mid-December to mid-March. Snow burrowing allows prairie-chickens and grouse to avoid the extremely cold conditions especially when it is windy and conserve heat and energy. This is in contrast to the non-native ring-necked pheasants (*Phasianus colchicus*) which do not snow burrow and are at a disadvantage in the extreme cold and snow because they are not as mobile as prairie grouse nor do they have vascularized and feathered nares, or tarsi nor pectinate on their toes. The latter are projections on the side of their toes that make it easier for grouse to walk on the snow. The worst possible winter conditions for prairie-chickens are cold temperatures, with an early deep snow cover that becomes crusted so that birds cannot snow burrow at night and where the wind cannot blow portions of agricultural fields open to expose waste grains.

All the radioed prairie-chickens followed in Nebraska this past winter like 2012-2013 either fed in center pivot corn or soybean fields or where ranchers were feeding their cattle corn or supplements such as dried distiller's grain (DDG) from the nearby ethanol plants. The prairie-chickens pick the undigested corn from cow pies at feed areas. Night roosting typically occurred in lowland areas with taller lightly grazed vegetation. Droppings examined indicated that prairie-chickens were also feeding on rose hips (orange color and undigested seeds). However, note that all the radioed prairie-chickens in Nebraska just like birds in Minnesota fed on products provided by human agricultural activities. In Nebraska this consisted of corn fed to cattle and soybeans and corn in center pivots. In Minnesota it was soybeans, corn and wheat.

At this point it seems safe to say that prairie-chickens in Nebraska during cold seasons also prefer foods associated with agriculture either as waste in fields or where cattle are being fed. One has to wonder what they survived on before agriculture arrived and it is likely that they did not exist in the densities seen in the past and recently in Minnesota. It is pretty well accepted that prairie-chicken

numbers were greatly increased when Europeans arrived and began to plow the prairie and plant crops especially corn.

The majority of the birds observed feeding locally in Nebraska where ranchers were feeding their cattle were cocks. At times the ratio was as high as 5 to 1. Radio-marked hens that did not leave the vicinity of their nesting areas in winter were found in flocks dominated by cocks. This indicates that the cocks remained for the winter and that most of the hens were leaving them behind making seasonal moves to the surrounding area up to 75 miles. In contrast, in Minnesota there was no apparent sexual segregation as winter flocks contained both cocks and hens.

We have been collecting data on insects and broods since 2009 (Syrowitz 2013) by sweep netting selected habitat types and locations of radioed hens with broods. In 2014 we again collected samples in both Nebraska and Minnesota. Amanda Reynolds of Eagle Lake, Texas is picking, sorting, drying and building the data base for the past two years.

Past research by STCP on genetics and dispersal in *Prairie Chickens & Grasslands: 2000 and Beyond* (PCG2B) has dramatically changed the overall philosophy of prairie grouse management. Small populations have to be reconnected to larger populations and bird numbers increased in order to sustain genetic diversity or they will not be viable long term.

The information on a large number of young of the year especially natal dispersal is unique to research conducted by the author with STCP. When STCP started PCG2B this was considered the number one gap in our knowledge of prairie-chicken ecology. The general pattern in prairie-chickens is that immatures are more mobile than adults and hens are more mobile than cocks. This movement pattern has now been well established (Halfmann 2002, Toepfer 2003). We now need to have an understanding of how dispersal works in a large self-sustaining GPC population.

Over the years we have developed the search techniques and airplane set up used for radio-tracking prairie-chickens (two pilots in the plane, duplicate search transects, three element external yagii antennas, two and at times three receivers at same time). The receivers are computerized and can scan for radio frequencies at a set rate usually 2-4 seconds. There is no mode where a sensitive receiver can scan and pick up multiple frequencies - it has to scan each one individually. When 20-30 or more radioed individuals are missing and one is flying 90-100 miles per hour it is very easy to fly over or near a radio-marked bird and not pick up the signal using a single receiver because of the lag in time (it takes 120 seconds of scan time to cycle for each frequency). Hence two to three receivers are used to “stagger” the scan for more frequencies more rapidly so one is less likely to fly by or miss one. The airplane telemetry equipment is very sophisticated

and expensive and the searching is long and hard flying and restricted to good weather

In the winter 2012-13 at least 10 radioed hens in Nebraska migrated. All were adults and all moved over 10 miles to and from their 2012 nest sites. All moved to center pivot cornfields during the winter and then returned back to their nesting areas in March 2013. Seven adult hens that were not found during the autumn and winter aerial searches showed up at their previous year's nesting areas in March 2013. One radio-marked sharp-tail hen also migrated over 30 miles.

Five young of the year hens in Nebraska moved 10-41 miles from their natal area to cornfields but these moves were one way as none returned to their natal area. Some young of the year cocks moved up to 3 miles to nearby cornfields but most shifted to areas near booming grounds where ranchers were feeding cattle. What is surprising is that many of the birds that moved over 10-41 miles did not have to move that far to find corn fields or especially ranchers feeding cattle. The hens disappeared from the sandhilll grasslands in mid-October in both 2012, 2013 and now again in 2014 when it was still warm and no snow cover. The fact that adult hens returned from wintering areas to their previous year's nesting area the following spring and young of year suggests that tradition or past usage may be involved in these long range moves.

The movements in spring from the booming grounds birds were captured on were greater for young of the year than adults and greater for hens than cocks. And without exception all of the spring movements were greater for prairie-chickens in Nebraska than Minnesota and the difference was greatest for young of the year. The dramatically smaller dispersal moves in Minnesota and Wisconsin reflect less grassland habitat and the closer proximity of grassland to more agriculture.

Based on two years of data it is apparent that a significant portion - at least half of the adult hen population in Nebraska sandhills are migrating to winter feeding areas. Not all radioed-marked hens in Nebraska made large movements. Some adult hens in Minnesota like the adult cocks remained within 3 miles of their nest sites and fed where ranchers were feeding their cattle. In 2012-13 there were five such hens, two are still alive and neither has left the area they used last year. This year so far there are four such hens alive including the two from last year 2012-13.

Of the 30 adult hens located in Nebraska during the 2013-14 winter, 9 (30.0%) remained within 3 miles of their autumn areas, 8 (26.6%) were never found during the winter airplane searches yet showed up in their 2013 nest areas in early April 2014. This indicates that they also probably made seasonal movements of considerable distances from their autumn areas. The remaining 13 (43.3%) adult hens made seasonal moves to wintering areas of 10 to 75 miles with 7 making unprecedented movements of 24, 25, 31, 40, 56, 56 and 75 miles to wintering areas. All but one of the thirteen returned to their 2013 nesting areas by mid-April.

The latter bird remained 30 miles from last year's nesting area, nested 5 miles south of O'Neill, Nebraska.

All of the young year hens located dispersed 9 to 50 miles but none returned to their natal areas. Such migratory-like and dispersal movements of young of the year have never been documented in greater prairie-chickens and will mean that we will have to alter our concept of habitat utilization and especially how big of an area is necessary to maintain a viable prairie-chicken population. All of the winter areas consisted of undisturbed grassland surrounded by cornfields.

Cocks in Nebraska were the most sedentary as adult cocks wintered at most four miles from their home booming grounds (the one they displayed on in 2013) with most of all the rest remaining within 2 miles. The pattern of mean distances from autumn area to their wintering area was greatest for adult hens (17.4 miles, n=20, Range 1-75 miles) followed by young of the year hens (16.9 miles, n=7, Range 3-45) then young of the year cocks (Mean=1.6 miles, n=11, Range 0.5-3.0 miles). Adult cocks remained the closest to their autumn areas and home booming grounds (Mean=1.4 miles, Range n=7, Range 0.5-4.0 miles).

In northwestern Minnesota the seasonal movement pattern (autumn to winter) was the same as Nebraska with hens moving farther than cocks. Young of year hens in Minnesota made the greatest moves (Mean=2.8, n=9, Range 1-4) followed by adult hens (Mean=2.2, n=11, Range 1.3), young of year cocks, (Mean=1.7, n=10, Range 1-3) and adult cocks remained the closest (Mean=1.3, n=11, Range 1-2.5 miles). However the magnitude of the movements in Minnesota was at least six times greater for adult and young of the year hens in Nebraska (17.1, n=27, Range 1-75 miles) than Minnesota (2.5 miles, n=20, Range 1-4 miles). Movements of cocks were comparable between Nebraska and Minnesota.

None of the radioed prairie-chickens in northwestern Minnesota made movements from their home booming grounds or nesting areas like those observed in Nebraska. This seems to be because they all had agricultural fields with waste grains or standing corn in close proximity to their nesting and home booming grounds. None of the radioed birds in northwestern Minnesota moved further than 4 miles to their winter areas in 2013-2014 and one moved 8 miles in 2012-2013. There is no contemporary evidence of any long distance migration for prairie-chickens in Minnesota. However a few dispersing young of year hens have been documented dispersing 20-40 miles during the breeding season.

When this project started, nobody anticipated nor suspected that greater prairie-chickens especially the adult hens would make migratory seasonal movements of up to 75 miles between their breeding and wintering areas and that such shifts would occur in the largest expanse of "native grassland habitat" in North America. Most surprising is that these movements are made before there is any snow or really cold weather yet all radioed birds in autumn only have to move 4-5 miles to

find the same mix of agriculture and grassland habitat that they moved 10-75 miles to spend the winter. This suggests that these moves may be traditional in nature rather than the result of daily needs for food and cover.

We now have dispersal and winter movement information for two years 2012-2013 and are about to get a third year 2014 and with the 50-60 hens we will capture this spring we will have a large sample of radioed birds to collect a fourth year of winter information. And with the new technology (GPS modules) STCP could collect information on GPC movements that have never been documented nor will be collected for many years to come because of the large number of birds specifically young of the year that we can catch. Such information will be unprecedented for prairie grouse. It seems to makes good sense to finish out a fourth year because of the time, equipment, money, housing, landowner contacts permits and number of birds we have already invested in.

There was no opportunity to follow migrating hens to see how they made these moves. However it took at least three hens 56, 56 and 75 miles from their nesting areas at least 7 to 10 days to return from wintering areas to their 2013 nesting areas. The dramatic difference between movements of hens and cocks is puzzling at this time considering the fact that their daily movement patterns were similar once they were found at their wintering areas(s) - that is to feed in agricultural fields or rancher feed lots and night roost in nearby lowland or wetland grass usually within a half mile.

Natal dispersal movements were 3 times greater for hens in Nebraska than in Minnesota (9.4 versus 2.9 miles) and greater but not by much for cocks in Nebraska (1.1 versus 0.80 miles). The large difference in hen moves is likely related to the greater distances that immature hens moved to find winter food in Nebraska. This past spring three radioed young of the year hens dispersed 12 and 22 miles from the booming grounds they were captured on in April. And one young of the year hen dispersed 25 miles from her natal area. In addition one prairie-chicken X sharptail hybrid cock the offspring of a hen sharptail dispersed 20 miles from his natal area.

This type of movement information has not been documented in previous studies because researchers generally radio only 20-30 birds or attach a couple satellite radios and focus on reproduction ecology. There have been very few year-round studies of prairie grouse and there have been only five studies that have documented winter ecology (Toepfer 2003, Toepfer 2003, Toepfer and Eng 1990 and Rosenquist 1996, Toepfer 1988).

The similarity in dispersal in young cocks relates to their tendency to establish on nearby booming grounds which are much closer to their natal areas or where their mother nested. However, based on the number that move and the magnitude of their movements seen in Nebraska and lack thereof in Minnesota, it is thought at this time that natural dispersal in prairie grouse today is being influenced by the

presence of agriculture. The intrusion of agriculture into the sandhills is/has the potential to reduce mobility and the spreading of genes over the landscape - that is reduce movements and alter migration. This would be comparable to the phenomenon seen in migratory Canada geese called “short stopping” or where food availability alters migratory patterns and holds geese farther north
In Minnesota there is more plowed land than grassland and in Nebraska there is much more grass than plowed land. The maximum distance moved by a radioed hen in Minnesota in 2012-2013 was 8 miles. One thing we learned in following lots of radioed prairie-chickens is that when dispersing they will find and join with other prairie-chickens especially young of the year. If they establish they will remain and if not they move on to another group. Eventually they will join up with other birds and over the course of autumn and winter they can associate with a lot of different individuals. In this sense dispersal of young of year is more a social process rather than a function of habitat selection. A prairie-chicken especially a young of year hen chicken cannot go wherever she wants and she has to fit in and deal with the cocks and hens that are already in a given area.

Movements of hens may be influenced by the cocks especially adults and even sharp-tailed grouse (Toepfer 1988, Toepfer and Eng 1988). Cocks, especially adults tend to dominate hens in common feeding areas and movement patterns suggest that hens may avoid interacting with cocks unless they have to on the booming ground and/or when winter snow reduces the availability of food.

The area of the combined dispersal movements of the radio-marked birds in Nebraska in 2012-13 covered 1,123 square miles. This is over 4.5 times larger than the dispersal range seen in Minnesota (234 sq miles in 2012-13 and 15 times that seen in 2006-2007 in Wisconsin where birds never left the Buena Vista Marsh Wildlife Management Area (71 square miles). The maximum distance dispersed of 45 miles observed for young of the year in Nebraska would result in an area covering 6,360 square miles. The size of the dispersal seen in Nebraska from a management perspective is somewhat daunting when one thinks about how we can maintain grassland habitat for prairie grouse over such a large area of private land.

Daily movements were also greater in Nebraska than Minnesota but have not been quantified at this time. A number of birds regularly made moves of a mile or more from night roosting areas to feed in center pivot cornfields. They would fly to their feeding area in the morning, feed, then day loaf nearby, feed again in the evening, and then return to a night roosting area. This very movement pattern was also observed in Minnesota but the moves from night roosting to feeding did not exceed a half-mile.

The number of birds missing in Nebraska in 2014 as in previous years varies almost daily and often from day to night because of their mobility and the hilly terrain. Many of these birds should be found when we conduct an aerial search in mid-December. As of 15 November, 2014 we were missing just about as many

birds as we are following in Nebraska. Of 98 birds alive at the end of August 2014 at least 45.9% (45/98) were missing: adult hens 81.2% (18/22), young of year hens 65.4% (17/26) young of the year cocks 21.4 (6/28) and adult cocks 18.2% (4/22). This is the same pattern as observed in 2012. Just like last year the hens began to leave the trapping area in mid-October and by November most were missing.

Several birds were located a few times in autumn 2014 as they apparently dispersed; one adult hen was located 8.4 miles from her nesting area in mid-October for a single day and then disappeared. A young of the year hen moved 18 miles from the sandhills southwest of the study area to the east side remaining in the sandhills and is now feeding where a rancher is feeding his cattle. Five of the seven GPS collared birds have left the trapping area and two, a young of the year hen and cock have remained.

It is likely that we will never locate all of the missing birds because of battery/radio failure and destruction of the radios by mammalian predators. Some of these birds will probably never be found due to radio failure or destruction by predators but the radios should still be functioning and we will continue to look for them until 125% of their expected battery life runs out.

Adult cocks have a strong year-round tie to their territories on their home booming grounds or the one they displayed on the previous spring. Hence they tend to stay as close as conditions permit and as a result are the least mobile cohort. Hens have no such bond to a booming ground or nest site outside the breeding season and hence range farther to meet their needs, their priority is food and cover. Immature cocks tend to wander until they establish a home booming territory which can happen in the autumn, early spring, or even later during the breeding peak. All dispersing radioed birds in Minnesota and Nebraska were located within a mile of a booming ground and none were observed alone.

In Minnesota as of 5 November there were only four hens (5.4%) missing out of 74 alive on 1 September. And all the others have remained within 2 miles of their summer areas. Movement patterns are the same as in past autumns where birds night roost in the undisturbed grassland cover and feed in the adjacent agricultural fields (corn, soybeans, and wheat). In 2012-2013 all remained within 2.5 miles.

These past two years I have spent a good deal of time counting booming grounds in the autumn and winter in Minnesota to determine how often and how much time radio-marked prairie-chickens spend on the booming ground and how young of the year cocks recruit or become established on a booming ground. The year round role of the booming ground is a critical factor in understanding population dynamics and the habitat needs of the population. Autumn use of the display ground in prairie grouse is not very well understood because it has never been studied. Most people and many grouse researchers do not even know that prairie-

grouse attend the display grounds in the autumn. Today most prairie grouse research has concentrated studies on nesting and brood rearing and fall and winter ecology has been ignored.

My results show that attendance based on radioed birds during the autumn occurs almost daily for the adult cocks and that the adult cocks visit just before sunrise and remain on the ground for a few minutes to an hour to an hour and a half. The latter generally happens on warm, calm sunny mornings.

However in winters with little snow the cocks have been observed on booming grounds daily even when the temperatures are well below zero. The cocks defend territories just like in the spring and actually display but cannot boom as their air sacs are not fully developed.

Even young hens and adult hens visit the booming grounds in the autumn and the cocks will court them in the same manner as in spring. Hens visit sporadically and some just once during the fall and young hens are more likely to visit booming grounds than adults. Observations suggests that when a young cock “holds his ground” against an adult, he establishes an area and becomes recruited to that ground and will then begin to move with the adult cocks. This recruitment can occur in fall, winter, or not until the following spring. Most young cocks are established on a booming ground by mid-April.

We collected more blood in 2014 for possible disease and pesticide analysis. However there are so many ongoing studies that are examining neonicotinoids that it seems best to wait for some of the results before we attempt to get funding to analyze our stored samples. Our data are unique in that we have samples from young of the year birds from an area in the sandhill grasslands in Nebraska where there are no pesticides used. This is critical because the young of the year birds leave the grasslands in autumn and winter and feed in the agricultural fields where they would be exposed to or consume some of these chemicals. See 2013 STCP Annual Report for additional information.

The prairie-chicken hunting season in Minnesota ran from 27 September to 5 October 2014. The limited number of permits issued 126, a season bag limit of 2 birds and short 9 day season prevents the likelihood of overharvest. An estimated 93 hunters shot an estimated 96 prairie-chickens in 2013 (MNDNR website). A total of 68 radio-marked prairie-chickens were known to be alive the day before the 2014 Minnesota hunting season. No radio-marked birds were reported shot by hunters and one was found to be missing. This would indicate a minimum and maximum harvest rate of at least 1.5%. This is comparable to the harvest rate of 2.5-5.0% in 2013 and 1.5%-5.7% documented in 2012. These data result in a three-year average harvest rate of 1.5-5.7%. No radioed birds were killed by hunters in Nebraska in 2014.

All prairie grouse captured are weighed and measured and examined as to their condition. As a result of this process during the summer of 2012 it was observed that a significant number of birds caught in Nebraska had cactus spines sticking in their tarsi and that some had “blackhead” like bumps where apparently a cactus spine broke off leaving part of it under the skin. This created an obvious bump that was easy to detect.

This past spring 2014 we found a higher incidence of cactus spines than in past 2012 and 2013 springs (none) because we just recently noticed spines in the toes and toe pads which we had not checked in the past. However during the summer and autumn of 2014 cactus spines and bumps were observed at a higher rate 37.1% (n=105) indicating that their presence was higher during the summer. The incidence of spines and/or bumps from late July to October was about the same 35.4% (45/127) in 2012 versus 32.7% (18/55) in 2013. The incidence of sand burs in the feathers was 17.1% lower than last year. However the incidence of sand burs in the feathers was 33.3% (18/54) during summer of drought in 2013 and 20.0% (8/40) in 2012. The number found and removed was 1-12. They were found on the butt flank feathers and feathers under the tail and flank.

Since 1996, a total of 94 GPC nests have been located within a mile of a wind tower complex we monitor in Minnesota. Nest success in proximity to this complex has ranged from 41.6-70.6% and averaged 57.4% 52.8% (54/94). This past summer 2014, fifteen nests were located within a mile of the tower complex and nest success was 60.0% (9/15). Nest success in the vicinity of the towers was higher than the rest of the study area 52.8% (19/36) in 2014. The reason for this is not clear and probably not related to the complex. This three tower complex is surrounded by a good deal of undisturbed grassland in CRP with much of it now in a MNDNR WMA and a well managed beef cattle ranch.

STCP’s longstanding approach to the placement of wind generator complexes is that they should be developed in degraded habitat such as permanent plowed land where they will have the least impact on prairie grouse and other wildlife species. This is now the Prairie Grouse Technical Council’s official stance as well.

The distribution of habitat is the critical factor as to where animals will go and often they will go close to manmade structures, as food, cover and security permit.

Prairie chickens will night roost, nest and feed near manmade structures if habitat is present and they are not disturbed. We have had prairie-chickens nest within 100 yards of houses, under electric transmission lines, near roads (closer to gravel/dirt than blacktop roads) and near large trees. As long as there is grassland cover adjacent to or up to the structure and there are no dogs, cats, or human disturbances the birds will utilize grassland cover near trees and manmade structures.

It may be that lack of habitat around or near manmade structures is the reason why chickens seem to avoid them. They can only nest or night roost where there is habitat and where the intensity of human activity will allow. It appears to be the human activity, not the structure per se that causes prairie-chickens to avoid manmade structures.